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GENERAL INDEX.

	Page.		Page.
A.		C.	
Abstracts and Reviews	123	Burrs	271, 344
<i>Acacia Baileyana</i>	557	Bursaria Aicana Forage	267
<i>Acacia Siris</i>	62	Bush Hay	347
<i>Acalypha</i> as a Fodder Shrub	471	Bush Home—An Artist's Impression ...	278
African Box Thorn	557	Butter Export Market	558
Agricultural Organisation	95, 556	Butter, High Quality, Queensland	178
Agriculture and Meteorology	226	Butter-making Growing Danger	130
Agriculture Community Interest	94		
Agriculture in Commonwealth	5		
Agriculture in Queensland ...	178, 292, 515, 522, 533		
Alcohol from Sugar Beet	544		
Annual Parasites, Combative Measures	353		
Apple Trees, Diseased, Prohibition ...	164		
Astronomical Data 92, 176, 276, 364, 470,	574		
Australian Dairy Council—Minister's			
Reply to Criticism	167		
B.			
Bacteria in Milk	468	Camel Poison Tree	159
Banana and Sugar Industry of Queens-		Cane as Fodder	3
land	403	Cane, Central Prices Board, Chairman-	
Banana Culture in North Queensland	73	ship	500
Banana-growing in North	473	Cane Field Reports	54
Banana Packing Test	137	Cane, Fiji Disease	280, 466
Banana Stalks—Stock Food Value	557	Canegrowers and Entomological Hints	50,
Barb Wire Reef	320		220, 285, 378
Bathurst Burr	271	Cane Pest Combat and Control	47, 284, 478
Bauhinia	344	Cane Pests and Diseases	51, 115, 213, 281,
Bean Tree	266		376, 481
Beet Alcohol	544	Carrot Bush	557
Berkshire-Tamworth Cross	348	Cassava Growing at Plane Creek,	
Better Horses	354	Mackay	91
Bird Sanctuaries Proclaimed	350	<i>Cassia neurophyllia</i>	127, 557
Black Grown Maize	298	Cattle, Soft Bone	466
Blood Scours	269	Caustic Plant	160
Blue Grasses	60	Caustic Vine	455
Boar Care	163	Central Cane Prices Board Chairman-	
Boar Condition	270	ship	500
Bolly Gum	60	Charlock Weed	159
Borer Infested Cane Farms	221	Chemist's Report	487
Bottle-tree Fodder	159, 454	Chilled Australian Beef for United	
Box Thorn	557	Kingdom Market	462
Bracken Fern Eradication	456	China Wax Tree	59
Brains Pooling	367	Cinchona	558
Brisbane Exhibition	177	Citrus Fruit Colouring Trade Practice	351
B.A.C.A. and Cotton Board	342	Citrus Packing Chart	164
Brünnich, J. C., on Stock Foods	180	Clean Milk, What is	125
Brush and Netting Fence for Pigs ...	552	C. S. Clydesdale on Dry Seasons	411
Bulbils—Yams	455	C. S. Clydesdale on Wheat and Pasture	
Bunchy Top, Alleged Remedy	358	Improvement	416
Bunchy Top, Departmental Action	297	Codling Moth	109
Burr Trefoil	344	Coffee Bush	268
		Cold Stores, Hamilton	68
		Colouring Citrus Fruit Trade Practice	351
		Committee of Direction of Fruit Mar-	
		keting	566
		Commonwealth and Dairy Industry	1
		Commonwealth and State Functions—	
		Clear Cut Definition Needed	2
		Commonwealth Production	467
		Community Interest in Agriculture ...	94
		Concrete Pig Trough	551
		Contagious Mammitis in Cattle	331
		Co operation—What it Means	351

	Page.
Co-operative Marketing Standardised Products	358
Cork Tree	160
Cotton	95
Cotton Board and British-Australian Cotton Association	342
Cotton Bush Weed, Milky or Wall-flower	61, 125
Cotton Improvement Laws in California	432
Cotton Market—American Decline	463
Cotton Planting	415
Cotton Prospects	461
Cotton Seed Importation	566
Cotton Seed Meal	159
Cotton Yields and Cultural Methods	179
Country Women's Association	475
Country Women's Clubs	475
Sir A. Cowley	512
Cowpeas as Pig Food	554
Cows Water Supply	275
Cream Production, First Grade, Six Essentials	349
Creamery Butter Making, Growing Danger	130
Cutworm Control	351

D.

Dairy Council of Australia	167
Dairy Cow	165
Dairy Farmers and Books	108
Dairy Ideal Cow	133
Dairy Production, Economy and Efficiency Need	278
Dairy Production Efficiency	331
Dairying Industry	95, 96, 178
Dairying Industry and Commonwealth	1
Dairying University Degree	165
Darnil Grass	343
Davies, J., on Irrigation in the West	426
Dentition of Sheep	172
Departmental Announcements	xi.
Desert Lime	343
Devil's Fig	61, 160
Dieting Pigs	458
Digger Wasp of Java	215
Distended Abdomen in Poultry	428
Dogs and Hydatids	466
Dogwood Poison Bush	161
Duroc-Jersey Pig	335
Dusting for an Important Queensland Pest	511
Dry Mash Hopper	328
Dry Seasons a Countering Field Campaign	411

E.

Egg, English, Market	165
Egg-laying Competition	140
Egg Preservation	166
Egg Production Anomalies	80
Eggs, Handling and Marketing	559
Ellangowan Poison Bush	161
Ellison, W., on Banana Culture in North Queensland	73
<i>Elæodendron microcarpum</i> Tree	300
Entomological Hints to Canegrowers	50, 220, 235, 378
<i>Eragrostis curvula</i> Grass	59
<i>Erythrophloeum labouchei</i> Poison Tree	159
Eucalyptus	61
Evening Primrose	457
Exhibition, Brisbane	177

F.

Fallowing, Main Principles	135
Farm and Garden Notes ... 89, 174, 273, 351, 361, 470, 572	
Farm Planning	35
Farmer Legislation	94
Farmers and Information	343
Fat Lamb Raising	366
Feeding Pigs	87
Fence for Pigs	552
Fern Eradication	456
Fertilising Pineapples	557
Field Peas and Cowpeas as Pig Food	554
Fiji Disease of Cane	466
Flora of Queensland	63
Flushing the Breeding Sow	157, 447
Fodders for Stock	159
Forage Trees	347
Forestry Farm	539
Foul in Foot	269
Francis, W. D., on Queensland Trees	74
Fruit Fly and Poison Spray	567
Fruit Fly, Queensland	101
Fruit Marketing, Committee of Direction	566
Fruit Marketing Organisation Act	474
Fruit Trees Bearing Habits	352

G.

Galvanised Burrs	271, 344
Gateless Fence Opening	163
Gestation Chart for Pigs	69
Gibson, E., on "Dry Seasons"	411
Gibson, A. E., on "Weighting the Silage Stack"	424
Grain as Fodder	159
Grape Fruit	272
Grass, <i>Eragrostis</i>	59
Grass Lands, Manuring	360
Grasses, Lawn	60
Grasses, Native	347
Greasy Heels	268
Green-topped Stringy Bark	61
<i>Grevillea sessilis</i> Plant	127
Guernsey Cow	171

H.

Hamilton Cold Stores	63
Hard Heads Weed	558
Headache Vine	457
Helicia	63
Herd Testing	365
Highway Improvement in Queensland	501
Honey Bean	268
Honey Locust	268
Honey Sorgho	70
Horse Itch	159
Horse Market for India	375
Horse Worms	270
Horses, Better	354
Hoya Poisoning	61
Hoya Vine	345
Hydatids and Dogs	466

I.

Indian Horse Market	375
Information to Farmers	343
Insects of Stanthorpe District	77
Iron Heating	171
Irrigation in the West	426
Itch in Horses	159

Page.

J.

Jacaranda Tree	343
Jarvis, E., Entomological Hints to Canegrowers	220
Jarvis, E., on "A Javanese Digger Wasp"	215
Jarvis, H., on "Codling Moth"	109
Jarvis, H., on "Injurious Insects of Stanthorpe District"	77
Jarvis, H., on "Queensland Fruit Fly"	101
Jarvis, H., on "Woolly Aphis Parasite"	105
Javanese Digger Wasp	215
Journal	279
Journal Appreciated	567
Judging Pigs, Hints	155

K.

Kapok, Native	60
Knot Grass	457
Knot Weed	457
Kurrajong Tree	344

L.

Lamb Raising	366
Lawn Grasses	60
Legislating for the Farmer	94
Levy Regulations	166
Levy Regulations, Sugar-cane	272
Lime, Wild	343
Linseed Meal for Pigs	162
Liquid Manure	569
Litter Contests	545
Live Stock Feeding	512
Live Stock of State	165

M.

Macadamia	63
Magnetic North, Queensland	329
Maize, Black-grown	298
Maize, Favourable Market for	178
Maize Improvement	279, 404
Manure, Liquid	569
Manuring Grass Lands	360
Marketing of Primary Products	368
Marketing, What is it?	367
McKeon, C., on "Maize Improvement"	404
Measurement of Standing Timber	79
Medick Burr	344
<i>Melicope stipitata</i> Tree	299
Meteorology and Agriculture	226
Mexican Clover	454
Milk and Minerals	168
Milk bacteria	468
Milk Can, The End of the	352
Milk Fever	269
Milk Maxims	352
Milk, Peculiar Smell	269
Milk, Pine	63
Milk Production Rations, Twelve	122
Milk-recording Advantages	355
Milk Sliminess	275
Milk Weed	125
Milky Cotton Bush Weed	61, 125, 160
Milky Vine	344
Mongrel Sires, Menace in Horse Breeding	354

Page.

Motor-car as Pest Distributor	554
Motor Transport of Pigs to Market	340
Motor Transport of Sheep	541
Mouse Trap, Novel	84
Music at Paling's for Exhibition Visitors	164

N.

Nardoo	455
Natal Grass, Red	62
Native Bryony	343
Native Cinchona	558
Native Clematis	457
Native Fuchsia	345
Native Grape	457
Native Grasses	347
Native Kapok	60
Native Lucerne	267
Native Plumbago	267
Netting and Brush Fence for Pigs	552
Noxious Plants	352
Nysius sp. Bug Pest	385

O.

Oleanda Weed	61
Ooline	344
Opossum Skins Export	165
Orange Concentrated Juice	568
Orchard Notes	90, 174, 273, 469, 570
Organisation, Agricultural	556

P.

Painting Farm Buildings	359
Paling's Music for Exhibition Visitors	164
Palm Lily	457
Paralysis in Pigs	550
Paspalum pastures Renovation	279
Pastoral Industry, Condition Improving	366
Pasture and Wheat Improvement	416
Peanut Growing, Preparation and Planting	363
Peanut Production	169, 178
Peach Leaf Poison Bush	61, 160
Peach Poison Weed	61
Peas as Pig Food	554
Pest Distribution by Motor-car	554
Pest Infested Lands	461
Phalaris	344
Phosphatic Fertilisers	360
Pig Breeding and Feeding	162
Pig Concrete Trough	551
Pig Crates	553
Pig Feeding	87, 349
Pig Feeds and Feeding	348
Pig Food and Cow and Field Peas	554
Pig Judging Hints	155
Pig Linseed Meal	162
Pig Management	348
Pig Raising as Sugar-growers' Side Line	270
Pig Raising Pamphlets	157
Pig Raising Progress	179
Pig Rupture	161
Pig Weaning	64
Piggery Management	59
Pigs and Swede Turnips	458
Pigs at Melbourne Show	445

	Page.
Pigs at Show, Stud	259
Pigs Brush and Netting Fence	552
Pigs, Care and Handling	445
Pigs Concrete Feeding Floors	156
Pigs, Dieting	458
Pigs, Gestation Chart	69
Pigs, Motor Transport to Market	340
Pigs, Pleurisy	349
Pigs, Tick Paralysis	550
Pineapples, Fertilising	557
Pituri	455
Plant Bug, Important Pest	385
Plants Poisonous to Stock	160
Plants, Vernacular Names	266
Pleurisy in Pigs	349
Poison Peach	343
Poison Plants	457
Pollock, N. A. R., on "Honey Sorgho"	70
Poland-China Pig	435
<i>Polyosma rhytophloia</i> Tree	74
Pomelos	272
Potato Bush Weed	267
Poultry, Distended Abdomen	428
Poultry Fattening	430
Poultry Feeding	321
Poultry Keeping	179
Primary Products, Marketing	368
Production in Commonwealth	467
Prostanthera Plants	233
Public Curator's Office Record	356
Public Service	464

Q.

Queensland at Dunedin	396
Queensland Banana and Sugar Industries	403
Queensland Butter, High Quality	178
Queensland Fruit Fly	101
Quinine Berry	268
Quinine Plant	558
Quodling, H. C., on "Agriculture in Queensland"	292

R.

Radio and Rain	474
Rain and Radio	474
Rainfall in Agricultural Districts ... 86, 158, 232, 330, 423, 486	
Rattlepod Weed	160
Record of a Great Office	356
Red Ash	268
Red Currant Bush	344
Red Head Weed	61, 125
Red Natal Grass	62
Ringbarking	346
Roma State Farm Field Day	425
Royal Blue Grass	267
Royal National Exhibition	235, 301
Royal Society of Queensland	167, 271, 356, 465, 567
Rumball, P., on "Egg Production Anomalies"	80
Rumball, P., on "Poultry Feeding"	321
Rumball, P., on "Poultry—Distended Abdomen and Fattening"	428, 430
Rupture in Pigs	161
Rural Civilisation Building	3
Rural Organisation	368
Russell, P. L., of Wisconsin University	86
Russian Knap Weed	558

S.

	Page.
Sanctuary, Central Queensland	566
Sandalwood—Wilga	266
Sarsaparilla	455
Scented Top Grass	63
Scientific Research	94
Service Spirit Wanted	573
Shaddocks	272
Shade Trees in Burnett	456
Sheep Dentition	172
Sheep on Farm	278
Sheep Pest Nomenclature	560
Sheep Succouring, 4,000 at £1 a Day	357
Sheep Transport by Motor	541
Sheep Worms	459
Shelton, E. J., on "Concrete Feeding Floors for Pigs"	156
Shelton, E. J., on "Duroc-Jersey Pig"	335
Shelton, E. J., on "Flushing the Breeding Sow"	157, 447
Shelton, E. J., on "Pig Feeding"	37
Shelton, E. J., on "Pig Judging"	155
Shelton, E. J., on "Pig Weaning"	64
Shelton, E. J., on "Pigs at Melbourne Show"	445
Shelton, E. J., on "Poland-China Pig"	435
Shelton, E. J., on "Stud Pigs at Show"	259
Shelton, E. J., on "Young Judges' Competition"	143
Show dates	72, 163, 231, 291
<i>Sideroseylon singuliflorum</i> Tree	74
Silage Crops	169
Silage Stack Weighting	424
Siris Tree	62
Snake Vine	457
Soft Bone in Cattle	466
Sorgho, Honey	70
Sow Flushing	157, 447
Sows and Sterility	341
Sows Breeding Trouble	349
Staff Changes and Appointments ... 84, 164, 271, 350, 464, 566	
Standing Timber Measurement	79
State and Commonwealth Functions —Clear-cut Definition Needed	2
State Insurance	84
Sterility in Breeding Sows	341
Stock Crossings on Southern Border	350
Stock Fodder	159
Stock Food, Value of Sugar Banana Stalks	557
Stock Foods	180, 465
Storage of Eggs	141
Stringybarks	61
Stud Pigs at Show	259
Sugar and Banana Industries of Queensland	403
Sugar Banana Stalks, Stock Food Value	557
Sugar Beet Alcohol	544
Sugar-cane Levy Regulations	272, 463
Sugar-cane Plants Introduction	461
Sugar-cane Technologists' Triennial Convention	355
Sugar Experiment Stations ... 47, 114, 212, 280, 376, 476	
Sugar Field Reports 116, 222, 286, 379, 483	
Sugar-growers and Pig-raising	270
Sugar-growers Offer of Cane as Fodder	3
Sugar Industry Progress	178
Swede Turnips as Pig Food	458

	Page.		Page.
T.		Weeds	159
Tandem Hitch for Teams	83	Weeds of Queensland	125
Tank Site Selection	166	Weighting the Silage Stack	424
Tanning Barks	456	Wheat	95
Tar Tree	60	Wheat, A Promising New	425
Team Tandem Hitch	83	Wheat and Pasture Improvement	416
Texas Blue Grass	60	Wheat Board Levies	350
Tick Paralysis in Pigs	550	Wheatgrowers, First	452
Tie Bush	161, 344	White Apple	161
Tomato Culture	387	White Bauhinia	344
Tomato Culture, California Methods ...	514	White, C. T., on "Queensland Trees" ..	74
Ton Litter Contests	545	White, C. T., on "Queensland Weeds" ..	125
Trees of Queensland Undescribed	74	White Stringybark	61
Trees Suitable for Planting	346	White Women in Australian Tropics ...	450
Trefoil	344	Wild Cotton	125
Tropical Plants	62	Wild Gooseberry	343
Tropics of Australia and White Women	450	Wild Lime	343
Turpentine Bush	161	Wild Mustard Weed	159
		Wild Oleander Weed	61
U.		Wild Oleander	125
Umbrella Tree	343	Wild Peach Weed	61, 344
University Degree for Dairying	165	Wilga—Sandalwood	266
		Wine-making	569
V.		Wisconsin University, Notable Visitor	86
Veitch, R. on "An Important Queens-		Woman, The Pioneer	170
land Insect Pest"	385	Woods Naming Corrigenda	85
Vernacular Names of Plants	266	Woolly Aphis Parasite	105
Vitamins	460	Worms in Horse	270
		Worms in Sheep	459
W.		Y.	
Wallflower Cotton Bush	125	Yams—Bulbils	455
Water Lilies, Edible	455	Yellow Pea	557
Water Vine	344, 457	Young Judges' Competitions at Shows	143
Wax Tree	59		
Weaning Pigs	64	Z.	
		<i>Zieria Smithii</i>	267

INDEX TO ILLUSTRATIONS.

	Page.		Page.
A.		F.	
Abdomen Distention in Poultry ...	428, 429	Fence, Gateless Opening	163
Agriculture Ministers' Conference	4	Florida Wheat Plots	412, 413
Aphis Parasite	106	Fodder Plots ...	412, 413, 494, 495, 598, 499
		Foxtail Millet Plot	495, 499
B.		Fruit, Departmental Exhibit	256
Bananas Exhibit	307	Fruit Experts' Agricultural Conference ..	15
Barbed Wire Reel	320	Fruit Fly	101
Berkshire Pigs	67, 150, 151, 261, 264	Fruit Packing Exhibits	311
Bridges	503, 504		
Brisbane Valley (B Grade) Winning Exhibit	246	G.	
Broom Millet, Departmental Exhibit ...	257	Gateless Fence Opening	163
Brünnich, J. C., Agricultural Chemist ..	488	Gibson, A. E., Instructor in Agriculture	516
Burrum River Bridge	503	Gluya Wheat	418
		Graham, E., Under Secretary for Agriculture and Stock	9
C.		Graham, E., Under Secretary, Department of Agriculture, at Show	251
Cabbages and Irrigation	426, 427	<i>Grevillea assilis</i>	128
Cairns Tableland Road	502, 504, 505	Gympie Road	508
Cane, EK 28, 13 Months Old	117		
Cane Grub Infestation Map	219	H.	
Cassava Growing at Plane Creek	91	Herd-testing Exhibit	304
<i>Cassia neurophylla</i>	129	Hitch for Teams	83
Cavendish Banana Bunches, Northern Grown	73	Honey Sorgho	70, 71, 72
<i>Chaetodacus Tryoni</i> Frog. Fruit Fly ...	101	Hopper	323
Cheese Exhibit	305	Horticultural Departmental Exhibit ...	256
<i>Cirphis Unipuncta</i> Attack on Peaches ..	77		
Citrus Exhibit, Blackall Range	257	I.	
Cloncurry-Winton Road	511	Iron Heating	171
Clydesdale, C. S., Assistant Instructor in Agriculture	417	Irrigation	426, 427
Codling Moth	110		
Cotton, Departmental Exhibit	252	J.	
Cowpeas Fed to Pigs	555	Javanese Digger Wasps	215
Cowpeas, Warren State Farm	555		
D.		K.	
Dairy Cow Measurement	133, 134, 135	Kingaroy-Barker's Road	509
Departmental Court	256	Kolan Road	510
Digger Wasps	215	Kolan Shire Bridge	503
Dry Mash Hopper	328		
Duroc-Jersey Pigs	334, 335, 337	M.	
E.		Maize Trophy	244
Edible Shrubs Exhibit	256	Market Garden Exhibits	310
Egg Case	563	Maryborough-Pialba Road	508
Egg Production Anomalies	80	Mash Hopper	328
Eggs for Overseas	564	McCormack, Hon. W., and Lord Stonehaven	237
Eggs, Fresh and Stale	560	McKeon, C. J., Assistant Instructor in Agriculture	405
Eggs, Rotten	562	<i>Melicope stipitata</i>	299
Eggs, Soft Shelled	82	Mid-Yorkshire Sow and Litter, Prize-winners, Sydney Show	66
<i>Elæodendron microcarpum</i>	300	Millet Exhibit	257
Entomology Section, Departmental Court	240	Millet Plot	495
		Milky Cotton Bush	126

INDEX TO ILLUSTRATIONS *continued.*

	Page.		Page.
Mobsby, H. W., Queensland Representative New Zealand Show, Dunedin	402	S.	
Mouse, Novel, Trap	84	Saccaline Plots	493
Mundubbera Bridge	507	Sheep and Wheat	422
Murgon-Barambah	509	Sheep Dentition	172
		Sheep Motor Transport	542, 543, 544
		Short, R. P. M., Secretary to Conference of Ministers of Agriculture	13
N.		Show Opening	234
Nerang Bridge	507	Show Opening Day Parade	236
New South Wales A Grade Winning Exhibit	245	<i>Sideroxylon singuliflorum</i>	75
North Queensland Exhibits	258	Smith, Hon. W. Forgan	7, 371
Nysius Insect Pest	385	Smith, Hon. W. Forgan, at Show	251
		Soft-shelled Eggs	82
P.		Sorgho	70, 71, 72
Paspalum Renovation Plots	490, 491, 494	Standing Timber Measurement	79
Peaches Attacked by Caterpillars of <i>C. plus unipuncta</i>	77	State Cannery Exhibit	306
Peas Fed to Pigs	68	Stock Experiment Stations Exhibit	258
Peas Plots	412, 413	Stonehaven, Lord, and Hon. W. McCormack	237
Pig Crates	553	Sugar Experiment Stations Departmental Exhibit	253
Pig Litter Ready for Weaning	65	Sweet Peas Exhibit	250
Pig Points	144		
Pig-raising Departmental Exhibits	252	T.	
Pig Ton Litter	548	Tachinid Fly Parasites	48
Pig Windbreak	552	Tamworth Pigs	153, 154, 261
Pig, World Champion Sire	547	Tandem Hitch for Teams	83
Pig, Young Judges' Medal	147	Team Tandem Hitch	83
Pigs Concrete Trough	551	Tiaro-Bauple-Gootchie Road	510
Pigs Eating Cowpeas	68	Timber Measurement	79
Pigs Feeding on Cowpeas	555		
Pigs Motor Transport	340	V.	
Pilot Wheat Plots	412, 413	Vetches Plots	412, 413
Pittsworth Cheese	305		
Poland-China Pigs	260, 436, 437, 439, 440, 441, 442	W.	
<i>Polyosma rhytophloia</i>	76	Weevil Borers	48
Poultry Abdomen Distention	428, 429	Wheat and Sheep	422
Poultry-raising Department Exhibit	251	Wheat-breeding Exhibit	247
Power Alcohol Exhibit	241	Wheat Crops	418
<i>Prostanthera</i>	233	Wilson, R., Assistant Under Secretary for Agriculture and Stock	11
		Wool Department Trophy	253
Q.		Woolly Aphis Parasite	106
Queensland Exhibit, Dunedin Show	397, 399		
		Y.	
R.		Yorkshire Pigs	448
Roads	502, 504, 505, 508, 509, 510, 511		
Rice and Sorghum Departmental Exhibit	251		
Roses Exhibit	250		

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PART 1.

Event and Comment.

The Current Issue.

This month's issue contains an abridged report of the proceedings of the Annual Conference of Ministers of Agriculture which was held this year in Brisbane. Many matters of great importance to agriculturists were discussed, and some notable speeches delivered by representatives of the several States, all indicative of the serious attention that is being given to present-day farming problems. It is, of course, impossible to publish the proceedings in full, but it is believed that the report, in its abridged form, will claim the close interest of our readers. Affairs in the Sugar Industry, our main agricultural interest, are, as usual, well covered. Mr. Pollock has a note on Honey Sorgho, a variety of sorghum that has given exceptionally good results from field trials in the North. Mr. Hubert Jarvis contributes some informative notes on injurious insects in the Stanthorpe district. Banana culture in North Queensland is the subject of some useful notes by Mr. Ellison, a new contributor from the Fruit Branch. Mr. Rumball discusses anomalies in egg production, while Mr. Shelton has his customary budget of practical information for pig-raisers. The pen is well supported, as usual, by the camera, and readers will find the July Journal generally acceptable.

The Commonwealth and the Dairying Industry.

The question of extending financial assistance to the dairying industry by the Commonwealth was discussed animatedly at the recent Interstate Conference of Ministers for Agriculture. The Western Australian representative, Hon. M. F. Troy, stressed strongly the need of the extension of practical Federal support to the

States in their efforts to stabilise one of the most important of our rural industries. The Commonwealth Government with its unlimited resources and its desire to invade State activities might very well help us, he said, to improve the dairying industry in the several States. He did not relish calling upon the Commonwealth Government to assist in this matter, that is if the Commonwealth Government were content to confine itself to Commonwealth activities, but to-day it is invading almost every State activity in its desire to help. By importing pedigreed dairy cattle from the older countries the Commonwealth could assist the industry better than the States with their limited resources. Assistance in improving flocks and herds and general production in the Commonwealth should be a function of the Central Government. All the developmental work of the country was left to the States. The Commonwealth with its abundant revenue was free from the ordinary commitments in respect to the control of lands, mines, and other activities with which the States were charged. The finding and development of oversea markets for their primary products were related to the improvement of methods of increasing production and raising live stock standards, and these came naturally within the range of Commonwealth interest. His motion, that it was desirable that Commonwealth financial assistance should be given to the States in their efforts to improve the conditions of the dairying industry, met with general support.

Commonwealth and State Functions—A Clear-Cut Definition Needed.

Speaking on the same subject, the Minister for Agriculture and Stock (Hon. W. Forgan Smith) said that the proposal opened an avenue by which the Commonwealth could come legitimately to the assistance of the States. Those who had been in touch with agricultural departments in recent years realised, he continued, that Federal activities in connection with the dairying industry had been in the nature of an intrusion into the domestic domain of the respective States, and the time was fast approaching, if it had not already arrived, when there should be a clear-cut definition as to what the State and Federal functions were in relation to matters which were now regarded as of purely State concern. Particularising the dairying industry, Mr. Forgan Smith expressed the belief that Commonwealth activity should be confined to the control of export and standard grades for export. It was the authority that operated in all the States and it could administer the same laws in every part of Australia, but in regard to actual production within the State, any funds it had at its command for the purpose of assisting the dairying industry should be spent through the State Agricultural Departments. By assisting dairying financially through the State services great and far-reaching benefits would accrue. For example, the principle would apply in the acceptance by the Commonwealth of the Conference proposal that a £1 for £1 subsidy on amounts contributed by the State Governments to purchasers of purebred dairy bulls should be approved by the Federal Government. About three years ago the Prime Minister (Right Hon. S. M. Bruce) spoke of the necessity of instituting what he called a "better bull campaign," and stated that his Government would make moneys available for the financing of the purchase of purebred dairy bulls in the several States, and that he would also give freight subsidies in respect to the transport of the animals. Reference had already been made at the Conference to the present great scarcity of purebred dairy bulls in Australia. As State Governments, continued the Minister, they had to legislate for the elimination of the scrub bull, but that would be useless unless they could replace him with a purebred animal. Financial assistance, consequently, in ensuring purebred dairy stock was very desirable. The Commonwealth with its great revenue resources, could do something practical along the lines suggested with great advantage to Australia generally. After all, they were merely asking for something to which the States were entitled as the actual revenue contributors. The State Governments had to develop the land, provide roads and railways, advance moneys for farm improvements, and in numerous other ways had to carry on the functions of Government, each in its own domain. The Commonwealth Government reaped the advantage of State activities through increased revenues. Any developmental work performed by the State was followed by increased population and enhanced wealth production. The benefit to the Commonwealth from these services was reflected directly in Federal

revenues from customs, excise, and other sources. Therefore, the proposal under discussion merely meant asking the Central Government to make moneys available for an Australian-wide industry from revenues the States had contributed. There need be no apology for asking for Commonwealth assistance in the direction suggested. It was Mr. Forgan Smith's belief that the Federal Government could assist the States materially in this and in other directions, and through existing State services benefit the whole of the Commonwealth.

Cane as Fodder—A Sugar Grower's Offer.

In one cane-growing locality in the Burnett district some of the crops have been so affected by a protracted dry spell that they will scarcely pay the cost of crushing. They do not contain, it is estimated by one grower, enough milling cane to cover the ordinary expenses of harvesting, consequently, he has had to consider the possibility of finding a market for his crop as fodder. He is seeking orders from stock-owners in districts that missed the normal rainfall this year. He has 20 acres of good, clean cane fodder carrying about 4 tons to the acre. Others have from 5 acres upwards. They are prepared to deliver the fodder on rails at from £3 to £4 a ton, and are keenly desirous of finding an immediate market. Particulars may be obtained from the Under Secretary, Department of Agriculture and Stock, Brisbane.

Building up a Rural Civilisation.

As soon as agriculture becomes a thoroughly organised and stabilised industry, as soon as farming becomes a payable proposition, as soon as country life contains all the social advantages organised communities should naturally possess, then land settlement should cease to be a problem and city life should lose some of its glamour and attraction for the bush boy and girl seeking more immediately profitable outlets for their energy and enterprise. As Queenslanders we have reason to be proud of what we have already done towards improving the conditions of country life. We have a huge, lightly-populated State. There are, for instance, some hundreds of thousands more people in the single city of Sydney than there are in the whole State of Queensland. Its immensity can be measured when we realise that Brisbane is actually nearer Melbourne than it is to Cooktown in our own State, and yet in spite of the fewness of our people, our vast vacant areas and tremendous distances we are building up a rural civilisation in a way that has already aroused the interest of other States and peoples. One big advantage Queensland has is the more or less decentralisation of her population and industries. Along our seaboard are situated coastal towns, each with practically its own railway system; each the centre of a province as large as Victoria and rivalling the Southern State in agricultural richness; each with either a developed or undeveloped coal field close at hand or in the near interior. Queensland has 6,236 miles of railway open to traffic, and in addition has shown a marked development in main road construction from a casual activity towards a reasoned industry in the hands of competent engineers. In all our efforts to improve the conditions of inland industry in Queensland, the comfort and well-being of our women and children are regarded as of major importance. A part of the general scheme is the protection of mothers and infant life. Education by means of travelling Domestic Science cars, correspondence courses for children in outlying districts where ordinary school attendance is impossible, and other facilities bring the Technical College and the school to the country town and the farm. Party and community telephones are also reducing the old-time isolation in rural districts. Efficiently managed hospitals and maternity homes; an excellent aviation service in the far west, where conditions are almost perfect for flying; the Queensland Ambulance Transport Brigade; and the Country Women's Association (a very fine organisation), are all factors in a State-wide effort to place the social amenities of country life on a par with those of the city. In fact there is not a phase of social advancement which is not engaging the attention of far-sighted, public-spirited men and women in Queensland to-day, and the evidence of this was commented upon most favourably by visitors to Queensland for the recent Interstate Conference of Ministers for Agriculture.



Photo. : "Courier."

PLATE 1.—CONFERENCE OF MINISTERS OF AGRICULTURE, BRISBANE, 7TH JUNE, 1926.

Reading round the table from left to right : Hon. M. F. Troy (Western Australia), Hon. T. Butterfield (South Australia), Colonel W. M. J. Bonnehier (Victoria), Hon. W. Forgan Smith (Queensland), Hon. W. McCormack (Premier of Queensland, who opened the Conference).

AGRICULTURE IN THE COMMONWEALTH.

STATE MINISTERS MEET IN CONFERENCE.

RECORD OF PROCEEDINGS.

RURAL PROBLEMS REVIEWED IN AN ALL-AUSTRALIAN ATMOSPHERE—
IMPROVING CONDITIONS OF COUNTRY LIFE—PLOUGHING A
STRAIGHT FURROW IN THE FIELD OF FARMING ORGANISATION—
QUEENSLAND'S EFFORTS COMMENDED—MANY IMPORTANT
DECISIONS REACHED.

A Conference of Ministers of Agriculture, representative of the whole Commonwealth, was held at Brisbane on Monday, 7th June, and following days. Matters of great moment to the farming industry were discussed and decisions reached on many important points. Some notable speeches were delivered in the course of the Conference. Visiting Ministers expressed themselves as deeply impressed with the evident progress Queensland has made in rural organisation. In the following pages is an abridged report of the proceedings covering the questions raised and debated, and which will be generally accepted as a valuable contribution to current thought and opinion on Australia's agricultural achievements, prospects, and problems.

The Ministerial Conference was opened by the Premier of Queensland (Hon. W. McCormack) at 10 a.m. on Monday, 7th June, in the old Legislative Council Chamber, Parliament House, Brisbane. In attendance were Hon. W. Forgan Smith (Queensland), Hon. W. M. J. Bouchier (Victoria), Hon. T. Butterfield (South Australia), Hon. M. F. Troy (Western Australia), Mr. G. D. Ross (Under Secretary for Agriculture, New South Wales), and Mr. H. C. Smith (Secretary, Tasmania).

With them were the undermentioned departmental officers of the respective States:—

Queensland.—Messrs. E. Graham (Under Secretary), H. C. Quodling (Director of Agriculture), A. H. Benson (Director of Fruit Culture), A. H. Cory (Chief Inspector of Stock), C. McGrath (Supervisor of Dairying), W. G. Brown (Instructor in Sheep and Wool), J. C. Brännich (Agricultural Chemist), F. F. Coleman (Officer in Charge of Seeds and Stock Foods Branch), P. Rumball (Poultry Instructor), A. Henry (Cane Prices Board), J. F. F. Reid (Editor of Publications).

Mr. L. R. Macgregor (Director of the Council of Agriculture) was also in attendance.

Other officers of the Department associated with the Conference were Messrs. H. Hunter (Agricultural Branch), H. Barnes (Fruit Branch), L. Cameron (Dairy Branch), T. Hope (Private Secretary to the Minister), and J. Kilmartin.

New South Wales.—Messrs. W. J. Allen (Fruit Expert), L. T. MacInnes (Dairy Expert), H. Luckman (Secretary).

Victoria.—Dr. S. S. Cameron (Director of Agriculture), Messrs. R. Crowe (Superintendent of Exports), J. M. Ward (Director of Horticulture), J. Thynne (Secretary).

South Australia.—Professor A. J. Perkins (Director of Agriculture), Messrs. G. Quinn (Horticultural Instructor), and W. L. Summers (Secretary).

Western Australia.—Messrs. Geo. L. Sutton (Director of Agriculture), G. W. Wickens (Officer in Charge of Fruit Industries), P. G. Hampshire (Dairy Superintendent), and W. Deane (Secretary).

Tasmania.—Messrs. A. Conlon (Dairy Expert) and P. H. Thomas (Fruit Expert).

Mr. R. P. M. Short acted as Secretary to the Conference.

THE PREMIER'S OPENING ADDRESS.

The Hon. W. McCormack (Premier, Chief Secretary, and Treasurer of Queensland), in opening the Conference on behalf of the Government, welcomed to Queensland the Ministers for Agriculture of the various States and their officers, who had met to discuss matters affecting the agricultural welfare of the whole of the Commonwealth of Australia, and had a very important and difficult work ahead of them. They had to deal with many problems embracing a wide range of climate and a wide sphere of agriculture, from the humid tropics to some very cold portions that do exist in Australia. He trusted that their work would be satisfactory, and that the States in general would benefit as a result of the exchange of views between the Ministers and officers of this important branch of Government activity. There were many problems facing Australia at the present time, and there was one important question to which he hoped the Governments of Australia and the man on the land would give attention, and that was to provide against periods of sub-normal rainfall. Sooner or later the Governments of Australia would have to face the problem created by the recurrence, at long intervals, of unfavourable seasons.

The Conservation of Fodder and Water—A National Concern.

Perhaps the problem was not within the ambit of a conference such as that, but in the last analysis it is a purely agricultural problem, for the conservation of fodder and water was the only method of providing for the dry periods that we occasionally experience. On other matters it was recognised that excellent work had been done in the various departments of the State, and there is ample scope for further activity. There was a community to legislate for, and upon the technical officers who have to deal with agriculture a tremendous task must devolve to educate the man on the land and make him understand the value of applied science to agricultural problems. He expressed regret that the representatives from other States had not the opportunity of visiting the more distant portions of the State, but if the opportunity did occur he was certain that his colleague (the Minister for Agriculture and Stock) would be only too pleased to take advantage of it.

Queenslanders Quite Good Australians.

He expressed a hope that their stay in Brisbane would be happy, that they would gain some personal knowledge of our capital city, and return to the Southern States with a conviction that Queenslanders were quite good Australians in every sense of the term. We were here in a big State with a small population and immense natural resources and in great need of development. We had a State that could produce almost anything. Our difficulties were the need of population and a more scientific method of dealing with and exploiting the resources that Nature had given us. One of the results of that Conference would be that we would advance a little further in the direction of utilising the natural wealth of this great State. The same advantage, he hoped too, would accrue to the other States. The Premier then, amidst applause, formally declared the Conference open.

The Hon. W. Forgan Smith (Queensland) was elected Chairman of the Conference by unanimous vote.

Vote of Thanks to the Premier.

On the motion of Colonel the Hon. M. W. J. Bouchier and the Hon. M. F. Troy, a hearty vote of thanks was accorded to the Premier (Hon. W. McCormack) for opening the Conference. The hospitality of the Queensland Government and the excellent arrangements made for the comfort of the visitors was referred to appreciatively by Colonel Bouchier. It was the first time that he had had the pleasure and opportunity of visiting the great North-eastern State, and he, with the other visitors, had been profoundly impressed with all that they had seen in their journey from the Border across the magnificent Darling Downs, and also below the Range. The visitors realised that they had only seen a small portion of Queensland, but of its resources and picturesque scenery they had had wonderful evidence. They recognised that Queensland was in a position to produce everything that man required—all those things which she desired for the happiness and prosperity of her people, and in that respect Queensland enjoyed an advantage over all the other States of the Commonwealth.

Apologies were received for the absence of the Hon. J. T. Lang (New South Wales) and the Hon. J. Belton (Tasmania).

The Conference formally received the summary of the resolutions of the previous Conference, the subject-matter of which was referred to sub-committees, consisting of the several groups of departmental officers of the respective States, for discussion and report.

PERMANENT STANDARDS FOR WHEAT.

Mr. TROY (*Western Australia*): It is our desire that a permanent standard for wheat be fixed. This year in Western Australia the growers were fortunate where they dealt with merchants who sold early in the season. At present there is no weight standard fixed. A Western Australian standard has now been decided upon approximating the standard adopted in some of the other States. It is absolutely essential that a standard operating throughout the year should be fixed. If any change were desired then it could be made at a conference of this character. If a standard is fixed then we shall have no difficulty in arranging for our shipments early in the season. I hope that the other States will fall into line with Western Australia. I move—**“That a permanent standard for wheat be fixed throughout the year.”**

Mr. ROSS (*New South Wales*): When this matter was mentioned my Minister proposed asking this Conference to take some action as suggested by Mr. Troy, but since then he has left for the United Kingdom, where he intends to make full inquiries respecting this matter and also of the requirements of the trade on the other side of the world. After the Ministerial Conference in 1923 a conference was held in Sydney of shippers and farmers, and they turned down any suggestion for interfering with the present system and fixing a standard. Since then the farmers' organisation and the Agricultural Bureau have changed their opinions and



PLATE 2.—HON. W. FORGAN SMITH, CHAIRMAN
OF THE CONFERENCE.

are in favour of grading. At that time the Minister was prepared to bring up the matter at this Conference, but when he decided to go abroad he planned to make full inquiries into the requirements of the trade on the other side of the world, and thus endeavour to meet the arguments advanced by the shippers. Until those inquiries are complete New South Wales can hardly take any action. The information that will be obtained by the Minister will be available to the other States when the matter comes up again for discussion.

The Position in South Australia.

Mr. BUTTERFIELD (*South Australia*): South Australia has taken no action in connection with fixing a standard. My own opinion as a Minister and a farmer is that there should be some standard fixed. The standard is fixed annually about the end of January, after harvesting is well advanced. Early harvested wheat may

possibly be sold on the previous year's standard, which has nothing or very little to do with the current crop. We have grown wheat for a long time in Australia, and we should be able to fix a standard for Australian wheat. We could take the past twenty years, say $61\frac{1}{2}$, 62, and $62\frac{1}{4}$, and ascertain what shall be the standard upon which merchants will buy and sell. That should be possible. The present practice is to fix the standard each year. One year it might be fixed at $61\frac{1}{2}$ and another year at 63. So long as the basis for dealing is made quite clear a standard could be fixed and, at any rate, it would give confidence to the people concerned. Supposing that wheat this year were fixed at 63, and next year's wheat is not up to that standard, the farmers would be losers thereby. It seems to me that a standard should be brought about in the interest of world traders so that they will know when we deliver our wheat that it is a pound under or above the standard, and they will have knowledge of what they are getting. A fixed basis for Australian produce seems desirable. I cannot see that we can do anything at present, and I suggest that we refer it back to the sub-committee until we have further information. It is a matter that should be referred to the Agricultural Bureaux and then direct to the farmers for an expression of opinion.

The Victorian Viewpoint.

Colonel BOURCHIER (*Victoria*): I would prefer to leave the position as it stands as regards the present f.a.q. At the 1924 conference the inadvisability of altering the present f.a.q., until the general bulk handling of wheat was introduced, was recorded. That is the position so far as Victoria is concerned. We have not yet established a bulk-handling system, although I think that is just a matter of time. In Victoria the opinion is held that it is not advisable to alter the grade.

The Practice in Western Australia.

Mr. SUTTON (*Western Australia*): When this matter was first raised by Western Australia it was on account of the fact that New South Wales had introduced bulk handling and we felt that New South Wales would probably be fixing grades. I prefer to use the term "standards," because in Australia grading has quite a distinct meaning to that which it has in America, and there might be some misunderstanding among our farmers if we talked about "grades." It was felt that New South Wales would be compelled to fix standards, and as those standards would naturally affect the other States when they introduced bulk handling, it was thought advisable to consider the matter at that time. At the same time it was felt that there were insuperable difficulties in the way of fixing a permanent grade whilst bagged wheat was being dealt with. Several years have gone by since then and that impression has proved erroneous. As Mr. Butterfield stated, we have now a long experience in connection with our wheat and we should know what our standard should be.

Since last year I have been making investigations and I find that, if you take all the information which we have had for the last ten years, if we eliminate cocky chaff and other foreign matter from the f.a.q. standards and simply deal with the millable grain, the grain is practically the same as the millable grain f.a.q. samples as fixed by South Australia for the last five years, and there is a striking similarity between that grain and the samples of other States. I have only the samples over the last five years, but the analysis shows that the other years would be practically the same. Because of that, as stated by Mr. Butterfield, we were compelled during the past season to fix a standard in order that some of our wheat should be sold, and we arrived at one which approximated to the last five years. The Western Australian standard sold and gave extreme satisfaction. Because of that experience I have no hesitation in saying that, first of all, though we have not yet got bulk handling, a standard can be fixed, and, because of the information we have regarding our f.a.q. wheat, one can be fixed that will give satisfaction to the trade. Furthermore, a standard can be fixed which will give the trade in Great Britain confidence. A week prior to leaving Western Australia we had a representative from an English firm, who was inspecting wheat at Fremantle. We happened to be giving a certificate to a cargo which was just leaving, and he was very much struck with what had been done. He made a public statement that he, knowing the trade in Great Britain, thought it certainly in the interests of Australia, both for growers and merchants, that a permanent standard should be fixed. Those who know the trade realise that, because otherwise the Australian merchant has no idea of what happens until several months after shipping. We received a cable recently that the London corn trade received our samples and they proved satisfactory. At that time we had only two cargoes to ship; 60 per cent. of the Western Australian wheat is shipped before it is possible to fix f.a.q. samples.

The difficulties previously thought to be insuperable in the fixing of a standard no longer exist. In view of that fact, and that it is also to the interest of the farmers—with which our Department is more particularly concerned—I think this

motion should be carried. Whilst we have a f.a.q. standard nobody ever hears of any farmer getting a premium for his wheat, and yet, as standard is a mixture of good and bad, and most wheat exported is f.a.q., somebody is getting the benefit, and it is certainly not the farmer. Therefore, in the interests of the farmers, it is advisable that a standard should be fixed.

The Value of Grade Standards.

Professor PERKINS (*South Australia*): I think Mr. Sutton has put the position very clearly, but I still do not see how the farmer who has wheat above the standard is going to benefit. I quite realise how the farmer below the standard will suffer. Unless you have a pooling arrangement, or unless the wheat is marketed by the State itself, you leave it to individuals, and it is pretty certain the man below standard will be docked and the man above will not get the advantage.



PLATE 3.—E. GRAHAM, UNDER SECRETARY FOR AGRICULTURE AND STOCK.

Of course, the trade interests in Adelaide do not favour a fixed standard, but if it were fixed by legislation they would naturally agree to it. The grade standard would induce farmers to clean wheat more thoroughly than at present. Now there is no advantage in cleaning wheat if the farmer gets no more. If wheat showed a tendency to be below standard, under the suggested scheme, it would be to the advantage of the farmer to clean it. If you can provide for the protection of the farmer with good wheat, it certainly would be an advantage.

The Canadian System.

Dr. CAMERON (*Victoria*): I wish to refer to one aspect mentioned by Professor Perkins—that of docking. When I was in America eighteen months ago I took occasion when crossing Canada to stop at Regina and visit two of the railroad elevators. In Canada there are four standards—Nos. 1 (northern), 2, 3, and 4. That year they had had frosts just before the harvest and large quantities of the

wheat were not up to No. 1 standard. On the day I visited these elevators the price of wheat was 1.52 dollars per bushel at Winnipeg. The freight from Regina to Winnipeg was 18 cents and the elevator charges 4 cents, making 22 cents off that 1.52, so that the price for No. 1 (northern) wheat at Regina should have been, that day, 130 cents. I was privileged to look through the books of both elevator concerns, showing the price paid for the wheat received on the day of my visit and the day before, and no wheat had been graded as No. 1 wheat. The average price paid to the farmers that day by both elevators was 100 cents. Allowing for freight and elevator charges of 22 cents, there was a dockage of 32 cents, otherwise about 1s. 3d. per bushel. One of the elevators that I inspected was owned by the Canadian Pacific Railway and the other was owned by a private trading concern, but both were on the same par, and it seemed to me that there was nothing to govern the rate of dockage. The man at the elevator was the judge of the grade of wheat that came in and the judge of the comparison between the standards of 1, 2, 3, and 4 that day and the wheat as delivered in the bulk car. It seemed to me he was docking unmercifully, because I never heard in Australia of wheat ever being docked to the extent of 1s. 3d. per bushel.

Mr. Butterfield: I have heard of 1s.

Mr. Troy: Was there no appeal?

Dr. CAMERON: No. The farmer drives in his bulk wagon to the elevator, delivers, and gets a docket as to the quality and the price. That is an end to it. He goes away. He is very much in the same position in that regard as the farmer here if he disputes with the agents of a shipping company. He has not got much of a chance. At any rate, there were no disputes. These farmers were accepting the dollar for the wheat at Regina while the Winnipeg price was 152 cents. The impression I got was that this grading might have a boomerang effect. At any rate, it set me thinking, and after that experience, while I regard grading as quite the right thing, I can see that it possibly might react in the direction Professor Perkins points out—namely, that every opportunity will be taken for docking. The value for standard wheat would be very difficult to get so long as buying remains in the hands of private firms and there is not what you might term "community buying." It should suffice if I convey to you the impression I got—it made one think hard, and I thought it would be extremely advisable to go steady with this proposal.

Mr. BUTTERFIELD (*South Australia*): The argument put up by the two directors cannot affect the position. This standard is fixed every year and dockage is fixed by somebody.

Dr. CAMERON: The dockage is fixed by the buyer—that is the trouble.

The Graingrowers' Interest in Shipping and Selling.

Mr. BUTTERFIELD (*South Australia*): That is the case the world over. In Australia there has been some attempt, by pooling wheat, to remedy that, and it seems to me that until the farmer has some control, either directly or through the various Governments of Australia, of the shipping of wheat and the selling of it abroad, that he will always be at the mercy of the man who says, "Well, you are docked 6d. or 1s." That is the position. Supposing you fix the standard at 62½, I do not think anyone will argue that the man who has 62½ wheat by careful farming has not an advantage over the man who has 61 wheat or wheat under 62½. He decidedly has an advantage. I think the fixing of a standard, and a high standard, will have a tendency to make our wheat more valuable, even under the dockage. I do not suppose there is anything to prevent that. In the case Dr. Cameron cited where they reduced the value of the wheat 30 cents, if it were not for some competition between the buyers they would have reduced it one dollar. If a standard is fixed we can look forward, in the near future, to the Australian farmers taking a more direct interest in the handling of their wheat and the selling of it. That seems to me to be a desirable corollary to the fixing of a standard—that the farmers themselves either co-operate or through their respective Governments take a stronger hand in the disposal of their product.

Queensland at Present not Vitally Affected.

Mr. FORGAN SMITH (*Queensland*): The motion deals with the principle, and perhaps it would be advisable to refer the two following items to their appropriate sub-committees, on which each State is represented by its departmental experts. The matter can be thoroughly discussed by them and referred back to us and be a subject for discussion again. That would facilitate business and we would arrive at an understanding much earlier. In Queensland we are not yet so vitally affected as are some of the other States. Queensland does not produce an exportable surplus of wheat, although on various occasions the Wheat Board has seen fit to export wheat from this

State. The Wheat Board operating under its own Act has done so successfully for a number of years. The board fixes a grade or standard each year, and the general principle of fixing standards is one that I approve of. If that method could be adopted it would be of advantage to the respective States. I intend to support the motion.

Lessons from Wembley.

Mr. TROY (*Western Australia*): I am glad to have the support of the Secretary for Agriculture in Queensland and to hear that the Hon. T. Butterfield also believes in the fixing of a standard. Quite recently a representative of a British firm interested in cargo-carrying investigated our methods of shipping wheat under Government certificate as to quality and weight, commended them very highly,



PLATE 4.—ROBT. WILSON, ASSISTANT UNDER SECRETARY
FOR AGRICULTURE AND STOCK.

and advocated permanent standards being fixed for the benefit of merchant, miller, and grower. I would like to refer to some lessons that we have learned from Wembley. The various wheat States of Australia exhibited some choice samples of white wheat—perhaps the best white wheats produced in any country of the world—but inquiring buyers in Great Britain, as well as hundreds of inquiring buyers and millers from various continental countries, were told that these were only samples and could not be purchased in large quantities. When asked for the shipping standards of Australian wheat, it had to be admitted that each State yearly fixed its own standard known as f.a.q. Buyers immediately contrasted these out-of-date methods with the up-to-date methods of Canada, where they exhibited their permanent shipping standards, the uniformity of which was guaranteed by the Dominion of Canada. This explains the confidence that wheat buyers and millers have in Canadian wheat compared with

Australian, and it also explains why Australian visitors to Wembley have, since their return, been stressing the importance of a uniform system of standardisation in the sale of Australia's primary products overseas. I look upon standardisation as being very important to Australia, particularly with a product that brings the second highest value in connection with Australian export. Happily the wheat yield in Australia is increasing so rapidly that within the next ten years Australia will, it is expected, be producing one-third again as much wheat as she is producing at the present time, and will be able to export that increase in grain production. The Governments of Australia have seen the necessity for fixing a standard for butter for export, and have done so with the sole object of placing a superior quality product on the British markets. From reports I have learned that the "Kangaroo" brand of butter is bringing the highest price on the markets. Australian wheat can compete with any other wheat on the markets of the world, and it is therefore highly desirable that we should have some standard fixed. It is highly desirable also that we should export our wheat to other countries of the world. I am not concerned with the farmer whose wheat falls below the standard. That is his lookout. With the educational facilities offered by the Departments of Agriculture throughout Australia, with the amount of money expended by those Departments and their effective propaganda there is no excuse for a farmer to become careless or remain careless and fall behind the efficient producer.

Mr. Forgan Smith (*Queensland*): The efficient farmer is entitled to the rewards of his efficiency. (Hear, hear!)

Mr. TROY (*Western Australia*): Yes. We send out lecturers and have tests conducted at various places and we are all the time urging the farmer to do something better. The aim of Departments should not be to consider the inferior man who produces the inferior article, but to look at the matter from a national standpoint and give every encouragement to the man producing the best article. This is the Western Australian standard—

Western Australian standard white wheat shall be dry and undamaged by moisture. It shall be free from weevils or other insects, and from smutty, musty, or other commercially objectionable smell.

It shall contain not more than 2.75 per cent. of foreign matter and screenings (from 2 mm. sieve) of the foreign matter; the percentages by count of the unbroken smut balls shall not exceed .2 per cent. of the millable grain.

Of the millable grain there shall be 98.5 per cent. white, sound, bright grain.

Of the other grain there shall not be more than .5 per cent. of bleached grain nor more than 1 per cent. of broken grain.

The weight per bushel shall not be less than 61 lb.

We fixed 62½, but we were given to understand that we were penalising our own farmers by doing so because the standard for the other States was less and our farmers did not get any more, because our standard was not an Australian standard. Recently the Western Australian Voluntary Wheat Pool sent a representative to London to inquire, amongst other things, into a wheat standard, and it was ascertained that the English buyers were not so much concerned about the weight per bushel as with the quality of the grain. Since that is an important factor on the London market then it is absolutely essential that a standard be fixed. We are pressing for the fixation of a standard. We know that in the past there were some farmers who did not produce a good quality grain, but in the interests of the Australian trade and the export trade particularly we should induce the farmers to produce the best quality grain. If that happens—and it will happen, because after all we have intelligent farmers—then we shall secure the best price on the world's markets.

The motion was seconded and carried unanimously.

MILLET—IMPORTATION OF "HURL."

Mr. TROY (*Western Australia*): In view of the decision of the Commonwealth Government to prohibit the importation of "hurl" millet from Italy, the Western Australian manufacturers of brushware are in the position of being forced out of business unless they can be assured of supplies from the Eastern States.

Prior to the prohibition Western Australian manufacturers imported this millet from Italy. Objections were raised against the importation of that millet on the grounds that a borer was introduced with the millet and that this borer was dangerous to maize and other similar Australian products. As a result of the prohibition Western Australian manufacturers were unable to get their supplies from Italy and then found they could not secure supplies from the Eastern States.

The Western Australian manufacturer is unable to purchase that millet known as "long hurl." That quality is absorbed by the Eastern manufacturers. We want to know whether a guarantee can be obtained from the States producing millet that Western Australia will be supplied, and, failing that, whether adequate safeguards can be given by this Conference permitting the obtaining of supplies from elsewhere as in the past. It is not desirable that maize and other commodities should be endangered by the importation of any borer or other pest, but I think the Eastern States should guarantee that we receive our share of the "long hurl" millet. It is suggested that the Conference pass a resolution to the effect that for the present the desirability of the continuance of the embargo is emphasised on the ground that the corn borer, once introduced, may do tremendous damage to maize, millet, sorghum, potatoes, &c., and I move—"That the Departments of Agriculture in the millet-producing States ascertain definitely—"

1. The actual requirements of the manufacturers in each State, and
2. The amount of suitable fibre available in Australia."

Colonel BOURCHIER seconded the motion.



PLATE 5.—R. P. M. SHORT, SECRETARY TO THE CONFERENCE.

Millet Acreage Extended—Home-grown Supplies Assured.

Mr. G. D. Ross: The position, so far as it affects New South Wales, briefly is this: The Commonwealth Government were somewhat belated in bringing the absolute embargo into effect, with the result that the New South Wales growers did not anticipate it and therefore did not increase their areas under this crop as much as they might have done. For many years past, owing to the competition from Italian millet, they found buyers have been offering very low prices—in fact the prices offered were not reasonable—but now they are quite prepared to extend their areas very considerably, so that, after this year, I do not think there will be any doubt at all

about the quantity of broom millet that will be produced in New South Wales. I can assure the Minister for Agriculture for Western Australia that, so far as the Department of Agriculture of New South Wales is concerned, they will do everything possible to assist in filling the needs of the other States and to ensure that, after this year, a much larger area of millet is planted so that there will be no difficulty in the future.

Queensland Concerned.

The CHAIRMAN (Mr. Forgan Smith): This question affects Queensland to some extent. I quite agree with Mr. Troy that where an embargo of that kind is granted the people locally should be in a position to supply all the needs of Australia. That is a sound principle which no one can combat. I would like to point out, however, that this embargo, as indicated by Mr. Ross, has only been recently applied by the Commonwealth Government, and as a consequence the industry has not had the opportunity of developing and organising to meet the demands upon it. As pointed out by Mr. Ross, the price at which millet could be imported formerly was used as a means of beating down the price of the locally grown product, and as a result the prospects of the grower were not sufficiently attractive to induce him to increase his areas. In Queensland, millet is the subject of a pool, and the production of this commodity has been properly organised. I am satisfied that within a year or so the amount required for Australian requirements will be forthcoming. It appears to me to be a good suggestion that Western Australia, or any other State affected, should be in a position to set out the tonnage of millet required and the quality which they desire. The question of price also enters into the matter. I realise that if the quantity is insufficient to meet Australian requirements, then increased production is necessary in those States which can grow it at the present time, but I feel sure, with the benefits of the embargo properly understood by the producer, sufficient areas will be put under this crop to meet all the requirements of the several States. It is all a question really of price to the grower. If the price is a suitable one, well, he will extend his areas, but under the old conditions with importations from Italy, the price was not sufficiently attractive to the local grower.

Colonel BOURCHIER (*Victoria*): I am generally in accord with the views expressed in regard to this question. It is most necessary that we protect our growers and that we insist on the embargo for another term of five years. A conference has been held, and we anticipate that this question will be adjusted amicably between the growers and manufacturers.

The motion was carried unanimously.

“Continuation of embargo on importation of broom millet fibre for further period of five years”—(Victoria and Queensland).

This is practically on the lines which I have just indicated. We are in favour of a continuation of the embargo on the importation of broom millet for a further period of five years. I move accordingly.

The Chairman seconded the motion, which was carried unanimously.

EMBARGO ON IMPORTATION OF BLACK-GROWN MAIZE.

Australian Living Standards must be Maintained.

The CHAIRMAN (Mr. Forgan Smith, *Queensland*): I move, on behalf of Queensland—“That an embargo be placed on the importation of black-grown maize.

This matter was affirmed, if I remember rightly, at the Hobart Conference. The principle it embodies is a sound one. Australia has adopted certain living standards, and those engaged in the production of a commodity have a right to those living standards, and, consequently, their industry should not be affected by the importation of commodities grown by cheap coloured labour. That, briefly, is the principle contained in this motion. You are aware, no doubt, that Australia can produce enormous quantities of maize. There are very large areas in Australia suitable for the production of this grain, and its cultivation can be extended to meet all the requirements of Australia. On various occasions large quantities of this black-grown maize from South Africa have been dumped into Australia to the detriment of those engaged in its production here. Since 1921, my Department has been in touch with the Commonwealth Government with respect to the duty on this product, and quite recently this Government has seen fit to adopt our suggestions. Up till 31st December last, the duty on imported maize was 1s. per cental British and 3s. per cental other countries. An amended tariff is before the Commonwealth Parliament, and duties are being charged by the Customs at the proposed new scale as from the 1st January last. This new scale provides 2s. 6d. per cental British and 3s. other countries. Although this is an improvement it is held to be still inadequate to protect the Australian maize grower. You will remember that quite recently there



PLATE 6. — AGRICULTURAL CONFERENCE — FRUIT EXPERTS.

Standing (left to right) : W. J. Allen (Fruit Expert, New South Wales); A. H. Benson (Director of Fruit Culture, Queensland).
Sitting (left to right) : G. W. Wickens (Officer in Charge of Fruit Industries, Western Australia); G. Quinn (Horticultural Instructor, South Australia); J. M. Ward (Director of Horticulture, Victoria); P. N. Thomas (Fruit Expert, Tasmania).

was an arrangement between the Commonwealth Government and the Government of South Africa for certain forms of reciprocity, consequently, the ordinary duty did not apply to South African maize until quite recently. In the Kingaroy district and southern portions of this State immense areas are under maize and on the Atherton Tableland large quantities of maize are grown. We have very many people engaged in its production on the Atherton Tableland—on one of our soldier settlements there in particular—and it is felt by the Government of Queensland that, having adopted Australian living standards these should not be menaced by our being forced into competition with countries whose production costs are much cheaper, due to the low wage conditions that operate in those countries. I think it is a fair and sound proposition that that principle should be accepted. No one here will argue that the Australian should be expected to carry on an industry in competition with coolie labour of other countries. That, briefly stated, is the principle embodied in this resolution. Certainly the increased tariff granted by the Commonwealth recently will improve the position very considerably, but I am a strong believer in the principle of an embargo against that form of competition to which I have alluded. I therefore move the motion.

Mr. BUTTERFIELD (*South Australia*) seconded the motion.

Mr. TROY (*Western Australia*): Western Australia does not produce any quantity of maize and is not likely to do so for many years to come. There are occasions in Australia when we will need, very probably, to import maize in bad seasons. In 1914 we had to import maize.

The CHAIRMAN (Mr. Forgan Smith): It is a common principle, where an embargo has been granted by the Commonwealth Government and the local production is not up to requirements, that, with the permission of the Minister for Trade and Commerce, the shortage can be made up. That applies to the embargo on sugar and would apply equally to any other commodity on which there is an embargo of that kind.

Mr. TROY: It is essential in this case that the maize-producing States should be able to notify the Commonwealth Government early in the season as to their crop estimates. It is too late to think about importing this product when the season is ended.

The motion was carried.

EGGS FOR EXPORT.

“Uniform-grade standards for eggs in the States, and for export.”—
(Queensland.)

“Inclusion of eggs in shell and in pulp in the Commonwealth Commerce Act.”—(Western Australia.)

The CHAIRMAN: I beg to move the resolution standing in the name of Queensland, covering these items, and invite Mr. Rumball, the Poultry Expert of our Department, to express his views concerning them.

Mr. RUMBALL: Egg export is becoming a big feature in the expansion of the poultry industry in Australia. It is necessary to ensure a certain quality, and Queensland poultry farmers want to protect their future market by moving, even though it may be very late, in the direction of setting up a uniform grade throughout the Commonwealth. Eggs, when they reach oversea markets, will be known as Australian eggs, and if one State's exports are not uniform with those of other States a prejudicial effect on the market price must develop. Queensland poultrymen are of the opinion that some standard should be adopted on the same lines as that adopted in connection with the export of butter. The quality of the egg is also very important, and the easiness with which eggs can deteriorate before they are packed for export and in transit has to be borne in mind. We want both size and quality, and these requirements are common to all the States. The size of egg which should be adopted as the standard is rather a debateable point. Personally, I would like to see our first grade eggs kept up to as high a standard as possible. The Queensland Egg Board want an egg weighing a minimum of 2 oz. That, in my opinion, is a good standard at which to aim. It would fetch a higher price on the other side of the world and the cost of handling an egg of that standard is only the same as that of a lower weight egg. Other States accept an egg a good deal smaller. In New South Wales an egg of 1½ oz. is regarded as good enough. If we are going to mix up 1½ oz. eggs with 2¼ oz. eggs, there will obviously be a large variation in quality and general appearance, and it is appearance which is going to attract the consumer. It is admitted that a lot of our eggs just fail to attain the 2-oz. standard, and I suggest that a grade of 1½ to, possibly, 2½ oz., be accepted as the Australian standard.

It is a debatable point, but Queensland wants a large-sized egg in the first grade, and that is the egg that we want to export.

The Chairman's suggestion that the Conference take both items together was agreed to.

Mr. TROY (*Western Australia*): I second the motion. We in Western Australia desire to include eggs in shell and pulp in the Commonwealth Commerce Act, Part 2, clause 5 of which says that the export of goods enumerated under the Regulations is prohibited unless there is applied to those goods a trade description in accordance with the Act. If we achieve that, we bring those commodities under the control of the Commonwealth, and that will bring us somewhere near where the Queensland people want to get.

Colonel BOURCHIER (*Victoria*): I would just like to point out that a number of egg merchants operating for local consumption in Victoria sell eggs by the case, ungraded. Merchants who grade eggs on arrival at their rooms find certain grades are quite satisfactory for their trading purposes, namely, first grade, 2 oz.; second grade, $1\frac{3}{4}$ to 2 oz.; third grade, $1\frac{1}{2}$ to $1\frac{3}{4}$ oz. For consumption within the Commonwealth it is suggested that those grades be adopted. The view of Victoria in this matter is briefly this: It is recommended that no eggs be allowed to leave the Commonwealth which do not weigh an average of 2 oz. or 15 lb. to the 'long 100.' This is the weight in general demand on the London market and has proved satisfactory in every case where last export season eggs were shipped under Government supervision. England consumed over £34,000,000 worth of eggs last year, and of that amount was compelled to import slightly over £20,000,000 worth. We have been putting up a very good quality of egg, and I do not think that we should do anything which should pull down or lower the general average of the eggs, and I am inclined to think that if we adopt this resolution it will be a step in that direction. After all, if one State builds up a reputation for its eggs which have been exported I think that the standard adopted does not appear to be too low.

Mr. BUTTERFIELD (*South Australia*): South Australia takes up a very definite stand on this question. There was a conference of egg experts just recently which dealt with this matter. I have listened to what Mr. Rumball has had to say, and we are very much in accord with him in our State. In regard to the $1\frac{3}{4}$ oz. egg, there is, of course, some difference of opinion between the merchants who deal in them and the Agricultural Department. There may be a very decided difference in the point of view, and we said that the $1\frac{7}{8}$ oz. egg is the irreducible minimum and that to allow shipment of eggs of a less weight would be prejudicial to the export trade. Our representatives go on to say that in egg shipments last year from South Australia to the London market no eggs under 2 oz. were allowed. It, therefore, seems desirable that the Conference should settle the point. We shipped 2-oz. eggs, and if we can ship something better through the method suggested by Mr. Rumball, so much the better for the export trade. I agree with the 2-oz. standard; and our experts are of that opinion. The Farmers' Union does an immense business in South Australia in the export of eggs. It seems to me that the points mentioned by Mr. Rumball are points which the Conference should adhere to and support in an endeavour to improve the standard for export.

Mr. ROSS (*New South Wales*): The Producers' Distributing Company in New South Wales has had considerable experience in the export of eggs. In fact, they were the first organisation to experiment in this direction, and as a result of their experiments they claim that the demand on the other side is not for large eggs but for even sized eggs. If I might read an extract from a communication from them it may explain their attitude:—

“After an experience covering some seasons of shipments to the West coast of America and to Great Britain the members of the Council are definitely of the opinion that a minimum weight of 2 oz. is altogether too drastic and if insisted upon will seriously reduce the quantity which can be exported. In the early weeks of spring production, when the flocks are at their full vigour, 2-oz. eggs are fairly general, but this is not maintained in the heavy flush producing months—when the bulk of the export packing is done—and probably 75 per cent. of shipments made in the past seasons would be below the 2-oz. minimum, although an average of 2 oz. has been consistently maintained. The overseas markets do not ask for a large egg but for an even-sized egg.”

If a large egg is selected it will reduce the quantity for export and at the same time reduce the standard of the egg which has to be marketed here, and we consider that our own consumers are entitled equally to that—which I think is a sound principle. The experience of the P.D.S., then, is for quality. They have received the highest price paid, probably—25s. to 26s. per 10 dozen.

Dr. CAMERON (*Victoria*): What price do they pay the producers?

Mr. ROSS: I think 1s. 4d. up to 1s. 6d. per dozen. But when some other Australian eggs were bringing 15s. per 10 dozen eggs on the other side they were getting up to 25s. and 26s., so that apparently their eggs were in demand.

Mr. Rumball: They are exported by private agents.

Mr. ROSS: That may be, but still the P.D.S., which is a co-operative concern, look for quality, and they find that so long as they have an average of 2 oz. it meets the demand in the United Kingdom.

An Important Industry.

Mr. FORGAN SMITH (*Queensland*): I regard these two resolutions as being very important. There is a great field for expansion in the poultry industry in Australia. It is not generally known that the production of poultry and eggs in America constitutes the fourth most valuable agricultural industry in the United States. The average individual can scarcely realise that unless the figures are shown to him officially. That shows the capacity for expansion in Australia. In many portions of the Commonwealth we have considerable natural advantages for the expansion of that industry. Up to the present time eggs for export have not been included in the Commerce Act, and consequently can be exported without inspection and without any uniform grade being insisted upon. Since I have been Secretary for Agriculture I have received at least three deputations on behalf of the poultrymen of this State asking that a grade for export be established, and they have gone so far as to ask me to provide at their expense a departmental expert who will see that the eggs are graded so that they can be sold under a State guaranteed grade. Our information is that the 2-oz. egg on the oversea markets realises the highest price and consequently the producers of those eggs should reap the advantage instead of all eggs being regarded just as eggs, which happens where you sell any commodity that is ungraded. It is of importance to Australia that we sell under a guaranteed grade, because when the product becomes known on the markets of the world, and it is known that we can guarantee the standard, then we can command the best price and conduct our export trade much better than we have done in the past. My suggestion is that we agree to the principle and appoint a committee of experts to say what shall be a uniform standard or grade. The Queensland suggestion is that there should be two grades—

First grade—15½ to 16 lb. for long 100, no egg to be less than 2 oz.

Second grade—13 to 13½ lb. for long 100, no egg to be less than 1¾ oz.

I am not proceeding to argue on the basis of those grades. That is a suggestion. My suggestion is that we should approve of the principle, which is of importance and of advantage to the other States. We can appoint departmental officers to report later on to the Conference what the standard for export should be, so that when we make our representations to the Commonwealth Government they can be accompanied by what are the considered requirements of the various States.

Mr. CROWE (*Victoria*): We should be careful not to convey any other impression than that we are sending only first grade eggs from this country. The meaning is sometimes conveyed that in sending second-grade eggs we are sending eggs of second quality. That is not so. The eggs are all of the same quality but of different sizes.

Mr. FORGAN SMITH (*Queensland*): Queensland suggests that the standard of egg for export shall be—

“Not over four days after being laid, sound, clean, unwashed, and infertile.”

The two grades will be determined on size, the quality being the same.

Mr. CROWE (*Victoria*): There are many exporters in Victoria who believe that the minimum of 2 oz. should be adopted; again there are others who wish the weight to be as low as 1½ oz. If eggs in shell and in pulp are included in the Commonwealth Commerce Act then there is New South Wales to be considered. At the last Poultry Conference representations were made to have included for export eggs of 1½ oz. The 1½-oz. egg or 1¾-oz. egg might have been all right during the last few years when eggs were bringing a high price in England, but there is a tendency for Austria, Russia, and other European countries to enlarge their operations, and there is a likelihood of the price of eggs falling on the London market. The cost of cases, filling, handling, and breakages are the same with a 1¾-oz. egg as a 2-oz. egg. We shall quickly reach the period—I hope that it will be a long time yet—when it will be unprofitable to produce the small egg. If we persist in producing the small eggs it will wreck our export trade, therefore in the meantime we should endeavour to educate the poultry keeper to go in for hens that will lay the larger eggs. It is in that direction that the salvation of the export trade lies. The Commonwealth authorities have consulted me in connection with these matters. I know that the Regulations would have been brought in had it not been for the difficulty in framing

regulations embracing the requirements of New South Wales. If the Commonwealth agreed to bring in regulations under the Commerce Act providing for a grade of eggs for export and some of the States decided that a minimum of 2 oz. should apply, then I suggest that the name of that State or States be prominently featured on the brand on the case. The Commerce Act provides that the word "Australia" be featured on the brand on the case, but it does not provide for the name of the State to go on the brand. The Commonwealth regulations provide for the inclusion of anything that is true. It is true that the eggs will be produced and shipped from Queensland or Victoria or whatever State desires to have the 2-oz. minimum, and if the name of the State is featured on the brand on the case then the State or States are protected.

It was agreed that a departmental committee should draw up suggestions for a standard for export and report to the Conference.

UNIFORM SEED LEGISLATION.

Mr. TROY (*Western Australia*): This matter was discussed at the Conference in 1923 and referred to a committee. The committee consisted of Messrs. Coleman (Q.), Carne (W.A.), and the Director of Agriculture (W.A.). This committee finally submitted proposals which, after slight amendment, were accepted by all the States except Queensland, although this State did not offer definite objection against the proposals, but suggested that another conference should be held. This was not agreed to in view of the practically unanimous decision regarding the proposals previously submitted. It is therefore considered that the Conference should now definitely adopt the suggestions then made so that they can be accepted as the basis for any new or amending legislation. It is also suggested that the Commonwealth list of prohibited noxious weeds should be revised, and that each State provide a list of its noxious weeds with a view to having them included with those which are now prohibited from being exported. It will be noted that the latest regulations appear to be those of Queensland, which do not materially differ from those of New South Wales. West Australia does not appear to have definite standards for germination, and in Victoria it is understood that the legislation is not in full operation. Other States do not appear to have any legislation dealing with the matter, but apparently in South Australia imported seeds for sowing are tested for germination for purposes of the Commerce Act.

In view of that conference Western Australia passed legislation in 1923. There is legislation in New South Wales known as the "Seeds Act of 1921," in Victoria "Seeds Act of 1915," and in Queensland "The Seeds Acts of 1913-14." We import a good deal of our seed from the Eastern States and for that reason we would like to see uniform legislation.

I move that this item also be submitted to the expert officers of the Department with a view to securing suggested legislation to meet the needs of the whole of Australia, on a uniform basis.

Mr. COLEMAN (*Queensland*): The Acts in the different States covering this matter vary materially, and the one in Victoria appears to be inoperative. It omits such things as peas, oats, and such items. As in Queensland we are purchasing oats in large quantities from Victoria it will be seen we have an active interest in the abolition of the last clause of the Act. The Victorian Act really does not deal with agricultural seed, while our Queensland Act does, with the exception of flower seed.

Referring to the committee mentioned by Mr. Troy, it is unfortunate that that committee never met. If it had I think we would have managed to clear the air. In the recommendations put forward, Johnston grass was included. In Queensland we rather object to the inclusion of that item, as it tends to admit it to be agricultural seed. It is against our present policy to consider it as other than a weed, and a bad one, under a Cultivation Act. There was also a possibility of including tank weed. The machinery for an Act and the Regulations dealing with standards are two different things. If we pin ourselves down by legislation we might get ourselves into trouble because of unforeseen exigencies, but it is possible to fix standards for purity as the necessity arises. We have to deal with the matter on the principle that the grower will be able to sell his produce to the merchants and we should not place unnecessary restrictions on the merchants.

Up to the present the Victorian Act excludes farm seeds, in which we are greatly interested. South Australia does not appear to have any Act, nor does Tasmania. Our trade relations with New South Wales are important, and when the new railway is completed they will be more important still, and we shall have to consider the effectiveness of the legislation from the point of view of the other State as well as our own. Then there is the question of the different plants and seeds used. In Queensland we are not associated with some of the crops with which you are associated in the Southern States. We have not clover—except White Dutch. Ordinary European grasses are also non-existent here.

Mr. SUTTON (*Western Australia*): We can never hope to arrive at uniformity in details for all States in such a vast continent as ours, but we can hope to arrive at unanimity with regard to principles. As a result of the conference referred to, the Minister representing Western Australia did bring in an Act which, for home purposes, worked satisfactorily. Merchants made no complaints in conforming to the Act, and it is easily operated. The main guiding principle is that the buyer shall know what he is buying and the supplier shall know the quality. We have purposely omitted prescribing standards for germination and purity. We have a provision prescribing that standards may be settled upon when desirable. It is considerably better to have some seeds, as during the war we had only Japanese rape seed of low quality, than to have no seed of any quality. That is why we adopted that provision. We dealt with the objections of other States and received correspondence from those States suggesting amendments, which were adopted, and finally the whole matter was submitted to all the States, and accepted by all with the exception of Queensland, and to-day I do not know the reason why Queensland did not accept those conditions which were acceptable to the other States. I therefore hope we shall reach finality at this Conference.

Dr. CAMERON (*Victoria*): I endorse the remarks of Mr. Sutton. The more I hear of this matter of uniformity in seeds legislation the less I think it is necessary. The Victorian Act, although dated 1915, is a consolidation, and was passed as far back as 1905. It has been in operation for twenty years and has given satisfactory results. The percentage of foreign ingredients is subject to prescription by regulation, and we have from time to time dealt with those percentages, but I think the percentages existing will stand comparison with those of any of the other States. For instance, dodder—we allow none of it. We contend the Seeds Act is to ensure two things: First of all, germinability, and secondly, absence of foreign ingredients, *i.e.*, ingredients foreign to that particular seed.

The motion was agreed to.

STABILISATION OF THE DAIRYING INDUSTRY.

The CHAIRMAN (Mr. Forgan Smith, *Queensland*): I move the resolution standing in the name of Queensland—

“Stabilisation of the Dairy Industry, by the setting up of Butter and Cheese Boards in each of the States, to act in collaboration with each other and with the Federal Dairy Produce Export Control Board in marketing.”

The object of the resolution is to stabilise prices with a view to giving those engaged in these industries that decent standard of living that they have a right to expect and demand in any free community, and, at the same time, to so scientifically organise the distribution as will bring about advantage to the State generally. The principle of the stabilisation of prices is one which has been given a good deal of consideration by every Government in Australia. As the Premier, in opening this Conference this morning, pointed out, we have vast natural resources; that nature has been kind to us, and that we have the opportunity of developing these to the extent of our industry and to the extent that we apply ourselves intelligently to these problems. The principle, that those engaged in the production of a commodity should have the right to a proper recompense for their labour and trouble in producing it, is one that every right-thinking man or woman in the community will agree with. But certain conditions operate, both here and elsewhere, which bring about a fluctuation in prices and bring about a state of affairs that is not considered desirable.

Queensland's System of Control.

In Queensland, under our Primary Products Pools Act, we have introduced a system of control which, with its limited application, has been of distinct advantage to the farming community. By means of this encouragement those engaged in this industry have had their material conditions improved, but that is affected somewhat by the limited application of the scheme. It can be readily understood that a State that sets up a good living standard for its people when it is subject to the competition of States or countries not having adopted the same living standards, then that competition immediately affects the stability of the standards that have been imposed. I do not propose to go into detail at this juncture other than to move the principle. We have with us here Mr. Macgregor, the Director of the Council of

Agriculture, who is also Government representative on the various pool boards, and he will outline to you what has been done in Queensland and what is actually meant by this proposal.

Queensland's Legislation.

Mr. MACGREGOR (*Queensland*): As most of you are aware, the Queensland Government, of late years, has caused to be enacted a very comprehensive code of agricultural legislation, in which legislation covering the marketing of primary products occupies a very important and prominent place. In this connection the farmers are being encouraged to avail themselves of the most modern methods of co-operative practice, and, in particular, to combine together on the basis of compulsory agricultural pools. We have, at the present time, under this legislation in Queensland twelve marketing boards constituted for the purpose of bringing about a more orderly system of marketing in relation to the products concerned. Our policy is to encourage the producers themselves to investigate their own problems. We assist them to do so. We assist them to ascertain just what the existing system lacks and to devise means whereby the existing state of affairs can be improved. Having decided upon the best system to set up in lieu of the existing system we also assist and encourage them to launch their marketing activity. In the case of some of the primary products of Queensland—and this would obtain also in regard to all the States—we are able to satisfactorily control the situation apart altogether from the circumstances that obtain in the other States. When we appointed a special committee of dairymen to look into dairying problems, however, it was early apparent that the question of stabilisation of the dairying industry was one which affected all the Australian States. We therefore made approaches to the dairying organisations in the other States; these organisations, in collaboration with Queensland, formulated a definite proposal to the Federal Government. The arrangement was that if these negotiations were brought to a successful issue an approach would also be made to the Governments of the different States. The Federal Government was asked to enact legislation dealing with the control of export and also to enable them to control all interstate trade in dairy produce. On this being achieved we were to ask for legislation setting up a State body in each State to enable the bringing about of orderly marketing intrastate. As most of you are aware, the representations to the Federal Government were only partly successful. The Federal Parliament ultimately enacted a measure dealing with the control of export only; the Federal Government having declined to introduce a measure dealing with the control of interstate trade. Upon this eventuating there emanated from Victoria a suggestion which has come to be known as the Paterson stabilisation scheme. This idea was first put forward by Mr. Delroy, of Murgon, Queensland, and was later taken up by Mr. Paterson, M.H.R., and has come into practical operation from the first of this year under the designation referred to. The matter was exhaustively discussed at one Melbourne Conference of Australian Dairying Interests convened by the Queensland Council of Agriculture. Our experience has been that voluntary co-operation is in the long run unsatisfactory. The Paterson scheme came into operation in the beginning of this year (1926). It was understood, of course, that the previous arrangements with regard to the setting up of State authorities would still stand good, and in May, 1925, Queensland constituted a Queensland Butter Pool, and the other States contented themselves with setting up committees of butter operators. The overseas price is largely governed by the capacity of the overseas consumers to buy, and it is a known fact that butter operators and speculators overseas do not like the price of butter to go too high, because immediately it does so their market shrinks owing to the inability of the old world consumer to pay the price. When it gets beyond a reasonable figure the consumer switches to margarine, and the consumption diminishes. We have this state of affairs additionally—that in competition with Australian butter in the world's markets there is butter from Argentine, Denmark, and Russia, in none of which countries can it be said that the Australian standard of living obtains, so that you have an overseas price dominating the position, such overseas price being largely governed by two factors—namely, the conditions of production in countries which have either more favourable conditions or a lower standard than Australia; and, secondly, a low standard of living in the consuming countries. Without some form of action by Australian dairymen, our prices, under our high standard of living conditions in Australia, are governed by those overseas circumstances and conditions which the dairyman contends ought not to be allowed to dominate the situation in Australia.

The Value of Organisation to the Queensland Dairyman.

In May, 1925—at the end of May—the Queensland Butter Pool came into operation. The result of the Paterson stabilisation scheme is that the price of butter in the Australian States has been lifted measurably out of the range of overseas parity. Overseas parity still operates in the case of New Zealand and, of course,

if the world's price of butter is low there is an opportunity for New Zealand to send butter to Australia, notwithstanding the protection afforded by the duty—so that overseas influence is not completely gone. The value to the Queensland dairyman alone, irrespective of the value to the dairyman in the other States, of the results of this form of organisation under the Queensland Butter Pool and the Paterson stabilisation scheme I estimate at the figure of £200,000 for the year to the end of April last.

What Stabilisation Means.

One reason for asking that stabilisation should be effected under legislative authority is because this scheme is loosely held together on a voluntary basis and may not hold together indefinitely. Additionally, it is particularly desirable that all these violent fluctuations of the market should be controlled by some measure of stability being brought about. Moreover, there remains the problem in connection with which it is apparent that even with the Australian consumer paying a margin above the cost of production, a very large export will defeat the result and bring about conditions under which the net return to the individual cream supplier will be under the cost of production by reason of the large quota which is being exported to a less remunerative market. The Chairman, in speaking a few minutes ago, made reference to stabilisation. That is a term which is not properly understood, and which I agree is somewhat difficult to apply at times, but it means bringing about regular, even, and more stable prices, a condition of affairs more favourable to the producer and more favourable to the consumer also than unorganised speculative conditions. For example, some little time ago I took out some figures in connection with the price of eggs in Queensland, and I found that the average price netted to the poultrymen was a fraction above 1s. 6d. a dozen. It was found that if the price could be stabilised all the year round, say at 1s. 7d. a dozen, the Queensland poultrymen would have received several thousands of pounds more for his production than he received under conditions where the variation was from 1s. in the glut season to 2s. 6d. or 3s. in the season of short production. It might not be possible just definitely to even out the price at 1s. 7d. in the case of eggs, but it is held that the margin should be reduced, and that the minimum price should be brought closer to the maximum, and that this would be in the best interests of both the producer and the consumer. My appeal is one for State legislative protection of the endeavours of the dairymen of Australia to improve their conditions and effect stabilisation.

The representatives from Victoria will know quite well that there are other matters bearing on this industry beside the price of butter. For instance, in Victoria the rents that are charged to the dairymen have a very material effect on the receipts of the dairymen in the final analysis. Then there is the question of the economic production of dairy farms. Can it be improved? The consumer, undoubtedly, has the right to ask if these things are being done, before you ask him to pay considerably more than is being paid outside.

Mr. TROY (*Western Australia*): At Hobart last year I took very strong exception to the Paterson scheme because it imposes a burden upon the consumers of Australia, and particularly upon the butter exporting States of Australia. There is nothing brilliant about the Paterson scheme, it is merely a plausible project in which you put your hands into the pockets of the consumers and give what you take to the producers. You take 3d. a lb. from the pocket of the consumer and give it to the producer. Mr. Paterson, at Hobart, was frank and ingenious and so innocent of any desire to do anything not right, that he said you could not ask the Commonwealth Government for a bonus as the bonus meant the payment of money, and he did not propose to do that. There is no difference in doing that and in putting your hands into the pockets of the consumers and asking them to pay the bonus. We are handling a good amount of butter in Western Australia, and one must view the matter as it affects the different States. The trouble is that land is too dear, that the value of land is not what it produces. Go down the north coast of New South Wales and they will tell you that land is worth £70 to £100 per acre, and in the same breath they will say they cannot live on the butter industry.

Colonel BOURCHIER (*Victoria*): I am strongly in favour of stabilisation schemes. We must recognise that unless we can make it worth his while the dairyman will not be able to carry on at all. We see the cost of production continually going up; we see the cost of labour increasing; every year the dairyman has to pay more and it costs him more to produce his butter, and therefore he is entitled to some consideration. All here will admit that there is no harder worked man to-day than the dairyman, whether he be in Victoria, Queensland, South Australia, or in any other State. Therefore, anything that can be done to assist the dairyman should be done, and if the Paterson scheme will assist him in the way it has been represented I am in favour of it generally. It is a basis for us to work on. I second the motion.

Mr. BUTTERFIELD (*South Australia*): I move, as an amendment, that the motion be altered to read:—

"To make for the betterment of the dairying industry we agree to the formation of Butter and Cheese Boards in each State to act in collaboration with each other and with the Federal Dairy Produce Export Control Board in improving the methods of marketing dairy produce."

I believe that something should be done in regard to the dairying industry. I am quite at one with those who say the dairyman needs something more than he is getting. I am prepared to assist in arriving at a more economical production if possible and to eliminate some or any of the extraordinary costs that attach to production. But members of the Conference must realise that in the dairying industry, as I know it—and I have been in it a long time—there are some contributing factors that the dairyman values very highly. I may give members of the Conference the benefit of my own experience as a dairyman when, with my family growing up, we milked 35 to 40 cows. Had it not been for that my family would have had to go out and work for somebody else, and we valued as a very great asset the fact that they were able to live at home; that my children were not being ordered about by anybody else. That is a very great factor in farm life, and it is one of the very finest values in connection with the settlement of our land—that it does enable us to keep our children at home with their parents in good environment. If you do not value that I am sure you will have to capsize all your ideas of value with regard to production in this country, because I do not know very many wheatgrowers, even in this country, who have made a competency sufficient to retire on without the assistance of their families, and that assistance has been given for very many years without standard rates of pay. If you want to allow in any industry connected with the land to-day standard wages and standard conditions, well, I do not think you can carry on those industries, but that value which contributed so much in our own case, and in other cases as well, is something that will always go towards keeping the agricultural industry of any country going. There are so many interests involved and so many difficulties that I do not think we would be wrong in carrying my amendment. It does not bind us to anything, but it does show this: That we are concerned about the industry, and out of an amendment of this kind there may be some evolution which will make for its betterment.

The Maintenance of Australian Living Standards.

The CHAIRMAN (Mr. Forgan Smith, *Queensland*): I would just like to say that the object of the motion is not to provide a justification for the Paterson scheme. The Paterson scheme, as has been pointed out by various speakers, is an expedient by the dairymen of Australia to deal with conditions as they find them; an expedient to enable them to equalise the prices as between export and import values to give them a better return. From the point of view of hard and fast economics the scheme can be attacked in various ways; but there is the position. The dairyman, so far as I can follow his reasoning, accepted the only means at his disposal to improve his conditions, and in lieu of a better system he adopted what is known as the Delroy-Paterson scheme. I lay it down as a definite principle—which can be justified by anyone having the interests of the people of his State at heart—that no one has the right to get any commodity cheap if its cheapness depends on the sweated labour of the men, women, and children engaged in its production. If an industry can only be carried on by the sweated labour of a man's wife and children, it is up to us as members of responsible Governments to do what we can to come to their assistance. In arriving at a just basis of assistance, due regard must be had to various important facts, some of which have been mentioned this afternoon. The difficulty on the land, as in any ordinary business, may be due to over-capitalisation. If a man is endeavouring to make a return from land for which he pays too high a price or for which he pays too high a rent, then it is unfair to charge the consumer a price based on that over-capitalisation. The same thing holds good with regard to any other business. If an industry on any account is over-capitalised it is carrying too great a burden, which the people under ordinary circumstances who use that business have to pay. I have always thought that in Australia some system of assistance to the agriculturist is a natural corollary of the protection which we give to the manufacturing industry. In Australia we give certain important assistance to various branches of the manufacturing industry, and industries affected by overseas competition can always approach the Tariff Board and state a case for an increase in the duty. That is done with a view to maintaining what has been referred to as the Australian living standard. If that is a sound principle in the manufacturing industries, such a basic principle can be applied with equal justice to the agricultural industry. Remember, agriculture must at all times remain the basic factor in the production of wealth in all the States. If we desire to have increased population and make use of the advantages which

Nature has given us in Australia, then we should be in a position to assure the man on the land—the man who is reasonably efficient and who runs his concern in a businesslike way—that return which under similar conditions is assured to men in other forms of human activity. That, I think, lays down the basis and the need and the justification for any sound scheme which might be adopted by this Conference.

Difficulties in the Way.

As Mr. Butterfield pointed out, there are many difficulties in the way—there always are in reference to any economic question, but we are concerned in the adoption of a scheme which we can justify in a logical way. The motion provides for order where there is disorder at the present time, by the establishment of butter and cheese boards for each of the States to act in co-operation with the Commonwealth Dairy Produce Export Control Board. The carrying of the motion or the carrying of the amendment does not commit us to the Paterson scheme or to any scheme; it lays down a logical method by which a satisfactory scheme can be brought forward and may be brought forward and dealt with. At the present time there is no organisation of that nature. We have organisations in almost every other form of human activity, in every form of human enterprise with the exception of the organisation of the stable products of the land. The man engaged in primary production is the only industrialist who produces without a foreknowledge of his market or without any control over the market which governs his prices. Therefore we are justified in establishing organisations which will give him that measure of control over his industry which we as Governments have sought to give to other forms of activity in our midst.

Mr. Troy: What about the manufacturer?

The CHAIRMAN: Manufacturers have their Chambers of Manufactures. They have organisations of various kinds which control market conditions and eliminate competition. These things, I repeat, operate in every other form of activity. The workers have their trade unions in which they can band themselves together with a view to securing a decent standard of living for themselves and for their dependents. The dairyman, in my opinion, at the present time in Australia is in exactly the same position as is the worker in any industry which is unorganised. If, for example, you had a state of no organisation in the building trade, where every operative was compelled to secure the best price offered by anybody willing to employ him, he would not be enjoying that condition which he enjoys at the present time. By means of organisation he has improved his position, and so can the dairyman.

Mr. Troy: He has to prove his case.

The CHAIRMAN: Mr. Troy points out quite truly that the worker has to prove his case for an increase, but if he were unorganised, no matter what he could prove, he would get very little.

Mr. Butterfield: I think we are all agreed with that.

The Value of Organisation.

The CHAIRMAN: If he were not organised he would not be able to get anything like the standard he enjoys. In the motion—there is no intrinsic difference between the motion and the amendment—we provide for organisation between the States whereby waste can be eliminated, whereby standards of efficiency can be laid down and improved marketing conditions brought about, and in countless different ways the conditions of the dairyman improved. I think that anyone who has followed the operations of the Federal Dairy Produce Export Control Board, whatever his opinion may be about the adequacy of this instrument, will agree that it has done something to improve the conditions of the dairyman in Australia. That board has justified its existence—it has improved conditions to some extent. What is wrong therefore with setting up some similar system of control over that proportion of dairy produce which is consumed in Australia? That, briefly speaking, is what the motion or the amendment asks for. We are not asking people to agree to the Paterson scheme or any definite scheme. We are asking them to agree to the establishment of boards which, if operated properly, and if they achieve the success for which we hope, will be able to confer benefits on the industry as a result of scientific organisation on the marketing side. There is no doubt at all that there are many factors other than the price of a commodity which lead to the continued impoverishment of the man on the land. Anyone would be blind and ignorant entirely if he did not recognise these things. We know that there are many conditions operating against placing these industries on a sound footing—over-capitalisation is one.

Mr. Troy: It is the most important.

Marketing Organisation Essential.

The CHAIRMAN: It is the basis of all business. If you are trying to run a business on too high a capitalisation you will soon get into Queer street, and just so will the dairyman get into Queer street if he pays too much for his farm, whether in the shape of purchase or rent. The Agricultural Departments in the various States assist in the way of improving herds, the conservation of water and fodder, and in fact in countless different ways. The Department can in these ways help to build up this industry on a sound footing, on a sound producing basis, but having put the industry on a sound basis you have to do something more—you have to provide a proper marketing organisation which will enable those in it to meet on equal terms those who compete with their product. Much has been done; much remains to be done. If the acceptance of the amendment will bring about unanimity in the Conference it will do an excellent thing, and if the boards are composed of men of vigour and intelligence I believe they will be able to carry out very important functions in the community.

The amendment became the motion and was carried.

Australian Dairy Organisation Scheme—Question of Commonwealth representation.**Legislative control of the use of sires for the improvement in breeding of grade dairy cattle.**

Dr. CAMERON (*Victoria*): A scheme has been suggested in Victoria which would provide, in the first instance, for bulls to be licensed which had only a small relationship to know high-producing stock and bulls out of high-producing grade cows not subjected to Government test, and as the number of high-producing bred bulls increased, to gradually tighten up, and in the course of ten years to have reached the stage when only either pedigreed bulls or bulls bred from tested stock would be licensed. That is a scheme which, it is thought, would certainly have the support of the bulk of the dairymen in Victoria at the present time. It is going to be a rather costly thing to administer. That side has to be taken into consideration, and before proceeding further in the matter it was thought desirable to take the opportunity of ascertaining the views of the other States. Our Government herd-testing scheme, which confines itself to the testing of pedigreed stock only, has been in operation for a period of thirteen years, and during the last six or seven years we have had an average of well over 100 herds under test. At the present time we have about 150, so that we have a considerable number of that class of bull available—perhaps a greater proportion than any other State—but still, if licenses were to be confined to that class of bull the number of bulls available would not at all meet the requirements. In addition to that, the Government subsidises herd-testing societies to the extent of £5,000 a year. We have forty of these societies in operation, and under the scheme which I have indicated, bulls, no matter of what breed or how they were got, are eligible if they reach a certain standard.

Mr. BUTTERFIELD (*South Australia*): We have a tax on bulls, though only small—10s. per annum. It was designed with a view to eliminating the scrub bull to some extent. Then, in addition, we subsidise the purchaser of a purebred bull to the extent of 60 per cent. of the price. There is a limit to the assistance, but if a man pays £50 for a bull we give him 60 per cent. of that sum.

The Chairman (Mr. Forgan Smith): Are there any restrictions as to the free use of the animal? Do you make any conditions?

Mr. BUTTERFIELD: There are certain conditions as to his use—by the neighbours, for instance, at a fee of about 10s. It seems to me that it would be quite simple to improve herds by buying up all the bull calves, or a certain number of the bull calves in the country each year from owners who did not wish to rear them or make use of them. The Government could set aside some country to carry them till they were available, marking them, of course, in such a way that they knew their pedigrees when they wanted to use them, and distributing them to dairymen in various parts of the State. That seems to me to be quite an easy method, and it would probably, almost certainly, make for a very great advance in the wealth production. There is no question that the sire is at least half the herd. We are breeding up to a better standard. Personally, I think that the best stock should be obtained with standard cows, and every bull calf dropped should be made of value to the State.

Mr. GRAHAM (*Queensland*): The position in Queensland is much the same as that prevailing in Victoria, with this exception: The State Government here subsidise any farmer who purchases an approved bull. An approved bull is an animal from a cow which holds registration in an approved herd book and has also been subjected to a long distance test with certain standards—that is, an aged cow should give 450 lb. of butter per year, with a corresponding decrease in production according to age. That is the only assistance that is given by the Department, and bulls of that kind are really the only ones over which the Department exercises any control, or

registers. The bulls from the State farms are being sold to dairy farmers, and the prices vary according to the production of the cow and the production of the dams of the sire.

Mr. Butterfield: They are all standard?

Mr. GRAHAM: No. That means that the cows are tested and if they attain a standard we say that they are "standard," but in a Government institution we are on a somewhat different footing from the private owner. It is provided that a cow must reach a certain standard at, say, two and a-half or three years. She is tested at her first lactation. The ordinary breeder would say that she had some difficulty in her calving and that she is nevertheless a good cow if she failed to pass the test. At five years' time that cow might qualify, so that in the sense in which the term would be used in a Government institution she would not perhaps be standard. We do not take the first failure into consideration—she has other opportunities to qualify. Then again, I think that we all know that this high production may be more or less artificial, and there will always be cows in herds which are not able to pass the standard. I do not think there is any breeder who has all his cows up to standard. We see that on the racecourse—where animals are bred for stamina and speed—and we cannot always say that like begets like. Generally, the obstacle which has stood in the way of any officer of the Department making a recommendation to the Minister concerning this matter has been the insufficient number of bulls in the State which may be looked upon as being of such a standard that they would be likely to improve the herds. We found that whereas there are something like 22,000 registered dairymen, not more than 30 per cent. of them were using purebred bulls, leaving something like 15,000 dairy farmers not observing that practice. On the other hand, counting all bulls, some of which were on the indifferent side from the point of view of production, not more than 2,000 animals were available. It may be said that that is not an excuse for not making the initial step, but when you start to legislate in such a matter you may find that the dairyman in one district is burdened with the responsibility of using purebred bulls, whereas in another, through force of circumstances, he is relieved of responsibility. There are difficulties in other directions, too. For instance, the purchasing power of the dairyman has to be taken into account, and I can quite see that in any scheme set up by the Government care would have to be taken not to inflate values. That is another aspect which would have to be carefully watched. There is also another difficulty. Take the grade bull. It is a rather good thing to encourage it, but sometimes it happens to be some animal which one feels is hardly worth it. If we force a man to buy an animal, it is very probable under present conditions that he will get what is really not a good bull. That was the position till we got to using bulls drawn from our purebred farm herds. The dairy farmer would get a bull from the best cow in his herd and use that, or he would buy one from a neighbour who had a good herd. That system has been in operation in various parts of Australia for a great number of years, and it is certainly not a successful one. I do think that some effort should be made, even if it were thought necessary to introduce prospective legislation. That would give the Government an opportunity of raising the complement of purebred dairy stock at the time that the legislation became operative. I am not too enamoured of the idea of using grade bulls. Many farmers in the closer settled districts are anxious to improve their herds. That anxiety is nothing novel and is not a recent development.

Mr. ROSS (*New South Wales*): The Minister for Agriculture in New South Wales has given instructions that a Bill dealing with this matter should be prepared. All our cows are tested under the United Pure Breeders' Association rules, and the yield has been increased considerably. The Jerseys average about 550 lb. of butter per animal, the Guernseys have been raised to 475 lb., and the Shorthorns and the Ayrshires to about 350 lb.

A Delegate: Eutter or butter fat?

Mr. ROSS (*New South Wales*): Butter. The progeny of these cows are offered to the farmers at a relatively low price.

Dr. CAMERON (*Victoria*): With the exception of a flock of crossbred sheep numbering about 1,000 or 1,500, which are used for lamb breeding, the Department of Agriculture in Victoria has every hoof registered. The crossbred sheep are used for lamb breeding by being mated with purebred sires. All our dairy cattle, Clydesdale horses, cross Leicester sheep, and Suffolk sheep, are registered. Our policy has been to introduce and hold on the farms stock that have not been tried out or exploited by private enterprise. It is held that it is a function that the Government should properly undertake. Our dairy stock are not those of ordinary breeds. We have red-pollled cattle and Friesians. The Friesians have become quite common in recent years, but in 1917, when the Government undertook the establishment of a herd of Friesians, there were only two Friesian herds in Victoria. We have introduced Suffolk and Ryland sheep, with the object of proving their merits, and they are breeds that are not undertaken or exploited privately. The policy for the disposal of the

dairy progeny has been this: It was thought that the system adopted by the private breeder for the disposal of his progeny was not a sound one. He usually picks out the animal he fancies and places a price on it and waits until he gets it, and very often that high priced animal is not worth the money that is paid for it by the purchaser, and so a system was adopted as far back as 1911 and has been carried on ever since. It has been a complete success. I commend the system. It is a system of offering the bull calves to breeders at a price based on the butter-fat production of the dam—on that alone—apart from make or shape or type. The price fixed was 1s. a lb. of the butter-fat produced by the dam, so that for a cow producing 400 lb. of butter fat the price for the calf would be £20; in the case of a cow producing 300 lb. of butter fat the price for the calf would be £15; in the case of a cow producing 200 lb. of butter fat the price would be £10. That system is still in vogue and it has been taken advantage of to the fullest extent possible. There has never been a month during the past twelve years when we have not had orders booked prior to calving. It is a wonderfully profitable system from the farmer's point of view, because he gets rid of all his bulls by the time they are a month or six weeks old. Furthermore, it enables the farmer to get a high-class bull at a moderate cost. The price of £20 for a bull from a cow producing 400 lb. of butter fat is very moderate. The system is a success, and the fact that it is appreciated by the farmers is shown when we show that we never have any bulls on hand.

Mr. SUTTON (*Western Australia*): We have what is known as the Dairy Cattle Improvement Act. We have realised that one of the greatest means of improving dairying production is by having purebred sires ex tested cows. For the first year we did not take very stringent measures, but we gave the farmer notice that the Act was in operation and that we would bring it actively into force the following year. Up to the present very little difficulty has been experienced in registering the bulls. There has been no standard set. The Act has been in operation for two years. The next step will be all purebred bulls ex tested dams. The Government is assisting farmers to purchase bulls on long terms—eight years—through the Agricultural Bank. The bank will not assist dairymen to buy bulls unless they are purebred ex tested dams. For several years prior to the passing of this Act—and I commend this to the agricultural officers—we were preaching the value of better bulls. The introduction of this Act and the necessity for filling in the form, which is simply designed, made the farmer think. The result is the farmer now knows more about what a registered and standard bull is than he ever did before. During the two years during which the Act has been operating there has been a greater educational effect than during the previous ten years of propaganda.

A resolution favouring legislative control was carried.

Commonwealth financial assistance to the States in respect to the Dairying Industry.

Mr. TROY (*Western Australia*) moved that it is desirable that Commonwealth financial assistance be given to the States in their efforts to improve the dairying industry.

The CHAIRMAN (Mr. Forgan Smith), in seconding the motion, said that the State Governments have to develop the land; they have to provide railways to give access to markets; they have to advance moneys for farm development, and in a whole host of different ways carry on the functions of Government within their own domain. The Commonwealth Government reaps the advantage of State activities by means of increased revenues. Any developmental work done by the State resulting in increased population and increased wealth production is reflected directly in the Commonwealth revenue through the Customs and Excise and other sources. Therefore, it is only asking the Commonwealth to make moneys available from sources which the States themselves have provided for research and other work that comes obviously within the Federal sphere.

Resolution 26—"That the Commonwealth Government subsidise the States at the rate of £1 for £1 of the amount contributed by the State Governments to purchasers of purebred dairy bulls" (Queensland), was agreed to.

Resolution 27—"That the Commonwealth Government defray shipping, rail, and quarantine charges on approved purebred farm or dairy stock imported from overseas" (Queensland), was agreed to.

Resolution 28—"That the Commonwealth Government subsidise the States at the rate of £1 for £1 of the State Governments' expenditure in the matter of herd testing" (Queensland), was agreed to.

UNIFORM LEGISLATION.

Dried Fruits.

On the motion of Colonel BOURCHIER (*Victoria*), the necessity for uniform legislation respecting dried fruits was affirmed.

Citrus Fruits.

The desirability of enacting legislation providing for the collection of levies, on a compulsory basis, on all citrus fruits marketed, for the purpose of creating a fund for the proper organisation of the industry was affirmed.

Tick Control.

A resolution, submitted by Mr. TROY (*Western Australia*), that the Commonwealth Government be asked to subsidise the States in respect to any approved scheme for preventing the spread of the cattle tick and for its eradication, was carried.

The Conference also approved, at the instance of Mr. TROY, of rigid inspection of stock, particularly in regard to tick infestation, at State and Federal territorial boundaries.

Pastoral Extension and Improvement.

At the instance of Mr. TROY (*Western Australia*), the Conference approved of united action for the extension and improvement of the pastoral industry, with special regard to research work in connection with the quality of fleeces.

PASTORAL.

Restrictions on Interstate Stock Movements.

Restrictions on interstate movements of stock in relation to the disease of pleuro-pneumonia contagiosa.

Major CORY (*Queensland*): This disease is of such a technical nature that I think restrictions were somewhat unwarranted. It is a disease that is prevalent in the Eastern States. The incubation period varies from a few days to a month, and consequently the restriction adopted by New South Wales of three months seems unwarranted, because there is no guarantee that it will be always effective. We should make the quarantine period a uniform period of two months.

Mr. ROSS (*New South Wales*): I think this is a matter that arises out of a proclamation issued recently in New South Wales, that cattle coming into New South Wales from Queensland must be accompanied by a certificate to the effect that they had not been in contact with affected cattle for three months. Special provision was made in connection with cattle coming to be slaughtered. The disease might remain quiescent in an animal for some time and that is the very reason why we are anxious to have this control. The policy followed in New South Wales is to destroy all infected cattle, to keep control of the inoculations, and keep a close supervision on the herds that have been released from quarantine. That method is apparently working well, because from the information that I have gathered outbreaks we have had have not been local, but have been brought by cattle introduced. It is particularly on account of the fact that the disease might remain quiescent for some time that we are anxious that there should be the certificate that the cattle have not been in contact with infected cattle for a period of three months.

Dr. CAMERON (*Victoria*): The restrictive control of pleuro-pneumonia in cattle is looked upon as a very important thing in Victoria. Once an animal is infected with pleuro-pneumonia it may apparently recover, but the diseased portion of the lung remains, very often tightened up, but subject to an outbreak at any time when that animal gets into a pneumonic condition or has an inflammatory condition in the area in which the old lesion is situated. Any animal that has ever had pleuro-pneumonia, if it continues to live, remains all its life a carrier of the disease and a potential source of infection in any herd to which it is admitted. Obviously, the thing to do, after recognising that fact, is never to allow the animal to recover from pleuro-pneumonia. In the case of outbreaks in dairy herds, our plan is to take the temperature of the cows every second day, and we have no hesitation, although there may be no other signs of disease, in destroying any animal showing an increase of temperature. That system was wonderfully effective, and between 1911 and 1914 we practically wiped out pleuro-pneumonia in Victoria. At all events, during those three years we had only six outbreaks, and none of those outbreaks were traced to a pre-existing outbreak in Victoria. They were traced to animals that had come over the border. Perhaps the drastic control measures and their cost may be said to have had a very good result in this way: The stockowners protested vigorously against the

ruthless slaughter of their animals on the occasion of outbreaks, and there arose a cry for compensation. That culminated two years ago in the passing in Victoria of the "Cattle Compensation Act," legislation which, so far as our present experience of it goes, is producing excellent results.

The Chairman (Mr. Forgan Smith): How is it financed?

Dr. CAMERON: It is financed by a levy on all stock sold. A duty stamp, called a cattle duty stamp, has been issued by the Stamps Department, and is effective in the case of all stock subject to slaughter or barter. If you send a pen of bullocks to any saleyards you receive back your account sales and they show a deduction of 1d. in the £1 on the prices realised. The thing is operating far beyond our expectations. Personally, I did not have a great deal of faith in the operation of the Act, because compensation for the destruction of diseased animals has been tried in other countries—

The Chairman (Mr. Forgan Smith): Does that apply to animals suffering from any disease—tuberculosis?

Dr. CAMERON: Not from all diseases. To tuberculosis, yes. It applies to animals suffering from anthrax, actinomycosis, tuberculosis, and pleuro-pneumonia, or any other disease for which an animal is destroyed on the order of an inspector of stock. Compensation is paid only in the case of destruction from such an order or on condemnation at the abattoirs—in the case of carcasses—by a meat inspector. In the country districts it has been found necessary to get a little amendment of the Act and allow for veterinary surgeons or approved inspectors to give such an order. All the money from the sale of stamps is paid into the Treasury. Stock agents supply themselves with these stamps, and the obligation is on them under the Act to make use of them when transactions take place, at the rate of 1d. in the £1.

The compensation is very liberal, seven-eighths of the live value of the animal at the time of slaughter. We find it advisable, and quite within the resources of the fund, even to extend that in the case of tuberculosis. Oftentimes an animal will be emaciated and not of much market value—it may not be worth more than £1 or 30s. if put up for auction—but so long as there has been no suppression of the knowledge of disease in that animal the stock officers are instructed to estimate the value of that animal as if it were healthy. Seven-eighths of the nominal value is allowed, plus the value of the hide, and the fund on that basis appears to be ample. So far there has been a surplus. The result of the Act has been that we are getting far more voluntary notices of disease, both of tuberculosis and pleuro-pneumonia, than ever before, and this has necessitated the appointment of four additional inspectors of stock and two veterinary officers to cope with the administration of the Act.

Mr. TROY (*Western Australia*): I was glad to hear Dr. Cameron's remarks on the compensation fund. We have in mind the providing of compensation for tubercular diseases, and the establishment of such a fund. It does not appear reasonable that the people engaged in the dairying industry shall have their herds destroyed willy nilly. Apparently Victoria is the only State that has passed such legislation.

Mr. H. C. SMITH (*Tasmania*): As we have no pleuro we do not need a scheme of compensation for that disease, but we have in operation a scheme of compensation in the case of tubercular disease. It is a condition that if the stockowner attempts to hide the fact that his cows are diseased when they are obviously suffering he does not get any compensation at all, but if disease is found as a result of inspection by the veterinary officer under the test applied, then he is entitled to two-thirds of the value of the animal.

The Chairman (Mr. Forgan Smith): We only compensate where the diagnosis has been wrong. We take the view that where the disease exists in an animal justifying its destruction it has no value.

Mr. H. C. SMITH: Compensation is to encourage any man who has diseased stock to report the matter.

Mr. BUTTERFIELD (*South Australia*): I do not think South Australia will agree to shorten the period of restriction. We have suffered considerably from the introduction of pleuro.

The CHAIRMAN (Mr. Forgan Smith): I think the discussion has been a useful one. I was interested to hear of the Act referred to by Dr. Cameron, and I would like to have a copy of that Act for consideration. There is something in the contention put forward by Mr. Smith, of Tasmania, that where compensation is paid from a fund to which the stockowners themselves subscribe there is not the tendency to hide the presence of disease. At the present time when herds are travelling on stock routes outbreaks occur, and they are often not reported unless owners or drovers are

absolutely forced to do so through the disease becoming general. Where a compensation fund is established it may be regarded as a sort of insurance, to which the stockowners subscribe, against non-disclosure of certain diseases.

Lice and Tick Infestation in Sheep.

The desirability of adopting active measures to control infestations of lice and ticks in sheep was discussed.

Mr. ROSS (*New South Wales*): Under the Stock Diseases Act of 1923 both sheep lice and ticks have been declared scheduled diseases and the Act is now being enforced very stringently. It provides for the quarantine of affected flocks until they have been successfully dipped and reported clean. Owners are not opposed to this. We find in nearly every case that they submit to voluntary quarantine without forcing departmental action. It is having a good effect in many districts and it is proposed to continue enforcing the regulations stringently. With regard to the introduction of infested sheep from other States, New South Wales has prohibited the introduction of sheep without a certificate, because it has been found frequently on examination at the border that sheep have been infested.

The CHAIRMAN (Mr. Forgan Smith): In 1921 we introduced regulations under the Diseases in Stock Act providing for the compulsory dipping of sheep in the way described by Mr. Ross. In addition to that, we provide for the compulsory quarantining of the properties on which the infested sheep were running, and that quarantine is not lifted until it is certified that they are free from this infestation. We have found that to be very effective and we have had no difficulty in enforcing the regulation. Queensland is comparatively free from the trouble alluded to in this resolution. However, we realise the importance of it, and were it necessary to increase the powers already taken we would not hesitate to do so. We have done practically everything that is suggested by Mr. Ross, and have even gone further and provided for compulsory quarantine.

Mr. TROY (*Western Australia*): We have adopted this compulsory quarantine in Western Australia. We make it obligatory on the part of the stockowner to dip his sheep within certain specified times.

The CHAIRMAN (Mr. Forgan Smith): The advantage of compulsion is this—that after the quarantine is lifted it is a guarantee from the Government that the place is clean, whereas if there is no compulsion there would be no such guarantee.

Mr. ROSS (*New South Wales*): The voluntary quarantine to which I referred is practically the same as compulsory quarantine. The quarantine is not lifted till it is lifted by the Department. The sheep are under supervision by the inspectors in exactly the same way as if the quarantine were compulsory. There is only one difference—that is, that we do not gazette the areas.

Colonel BOURCHIER (*Victoria*): We have compulsory sheep-dipping right throughout the State and sheep are not allowed to travel along roads or to be yarded in saleyards if they are tick infested. We have practical immunity to a large extent. Of course, we have municipal and other dips throughout the State.

Mr. BUTTERFIELD (*South Australia*): For the purposes of our Act, all sheep found in any flock or enclosure in which a sheep is found to be infected with tick or lice are deemed to be infected sheep; so that we have the provisions as watertight as possible in our State, and in that portion of the State which is subject to infestation we are very careful to see that the Act is carried out. The Stockowners' Association are unanimous in their desire that every precaution possible should be taken against infestation.

Mr. H. C. SMITH (*Tasmania*): We have had compulsory dipping in Tasmania for a number of years, and on the whole the system is working satisfactorily.

MARKETING.

The Conference proceeded to discuss the following matters:—

1. Facilitation of marketing scheme operating under the State legislation by adequate provisions respecting marketing finance—(Queensland).

2. That the benefits of the Commonwealth Rural Credits system be extended to all Commodity Boards and Pools—(Queensland).

3. Failure of the Commonwealth Bank Rural Credits Branch—(South Australia).

The CHAIRMAN (Mr. Forgan Smith): We can make adequate provision for the production of a commodity. The problem of the present day is one of successful marketing, and various schemes have been discussed and operated by State Governments with that end in view. The basis of successful marketing depends to a large extent on our ability to provide adequate financial resources for carrying out any scheme that might be adopted.

The resolutions in the name of Queensland and South Australia refer more particularly to the Commonwealth Rural Credits Scheme. I hold definitely this opinion—that the Commonwealth Bank is a financial institution that should function in the interests of the wealth producers of Australia. At its inception it was intended to be a national bank to finance the industrial operations of the people. Since then it has done excellent work in connection with the financial arrangements during the war, but up to the present time it has done little or nothing to assist agricultural production or distribution. It has sought to obtain gilt-edged securities in various ways, but little or nothing has been done in the way of financing co-operative activities or to assist agricultural projects. I remember last year when the Commonwealth Rural Credits Scheme was first introduced it was acclaimed in Queensland as the Farmers' Charter. Various speeches were made in this State setting out that under this scheme the necessary finance would be made available to co-operative organisations to enable them to build up their enterprises, to carry on marketing operations, and, in a word, a properly established Rural Bank would be called into being. I welcomed the idea that the Commonwealth Bank should take up this form of activity, but we are now disillusioned, because little or nothing has been done in the direction indicated at the inception of the measure. Take, for example, some of the obvious objections to the Act as it now stands—advances can only be made for one year, for instance. Certainly, it may be said that these can be renewed from time to time, but in the establishment of a co-operative butter factory, or any other form of industrial activity, a one year's loan is of no advantage at all. Then again, with regard to the marketing of various products, we find that the Commonwealth insist on the product being in the legal control of the bank—otherwise it will make no advance at all. Now, under the pooling system it has been found impossible—the reason is quite obvious—to place commodities in the legal control of the bank. They have to be stored in various buildings.

Mr. Butterfield: Frequently they have to be harvested.

The CHAIRMAN: Frequently, as Mr. Butterfield says, they have to be harvested. That is a very necessary part in the operations of any form of rural activity, so that provision in the Act makes it impossible for any of our forms of activity to be financed under the scheme. In Queensland we have something like twelve pools in operation, one of which operates within the ambit of its own Act—that is, the Wheat Pool—and the others are established under the Primary Products Pools Act. Those pools have engaged in various forms of activity. It can be readily understood that these pool boards require buildings in which to store the commodity which is pooled. In the case of maize we have silos for storage; in the case of wheat we have sheds; and in the case of other commodities we have various forms of buildings which must be secured in order to enable the controlling boards to carry on their business. The Commonwealth Bank, to which approach was made in connection with some of our pooling operations, advised the boards concerned that it was prepared to finance them under a system of State Government guarantee. There, gentlemen, you find this "Farmers' Charter," which was lauded so much at the time of its inception. Any private bank would provide an overdraft to any pool board on to anyone else with the security of the State behind it.

Mr. Butterfield: They all do.

The CHAIRMAN: They all do. As a matter of fact, just the other day the Maize Pool Board was able to make arrangements with one of the associated banks for all the necessary finance without any guarantee at all. In the case of the Wheat Pool the Commonwealth Bank provides certain sums of money from which advances may be made to the farmer. Generally the first advance is in the vicinity of 3s. per bushel, with further payments later on upon realisation, but the State Treasurer has to sign a guarantee in favour of the bank before those funds will be made available. That has been set out very fully. Then again, there are various other matters which affect the position. They have done little or nothing at all in connection with the exchange question. You will remember in 1924 the exchange on wheat amounted to 3½d. per bushel and the exchange on butter to ½d. per lb. Certainly, they were abnormal years, but they may occur again. That is a form of activity in which the Commonwealth Bank should assist the primary producers. Their activities should be concentrated in the direction of stabilising exchange as far as possible.

Rural Credits.

I believe that it is a sound principle that an institution such as the Commonwealth Bank should assist wealth production within the Commonwealth, and assist the man who is prepared to acquire land and establish a farm and engage in the production of commodities which are necessary for human welfare. Up to the present in this regard the Rural Credits Scheme has given to Queensland no advantage. So far as the Pool Boards are concerned the bank has told us that it will finance them if it gets a State Government guarantee. Another objection to the scheme is that the loan is limited to the duration of one year, and a further objection is that advances will not be made to individuals. They will only be made to existing institutions or to associations. No advance is made to the settlers direct as between the bank and them without the intervention of any other organisation. You will see from the points I have set out that the Rural Credits Scheme, which is now under discussion, has failed to function in the direction in which its sponsors said it would operate. It has failed to carry out the responsibilities of an Australian Commonwealth Bank, and it is fitting that Ministers for Agriculture should publicly stress these matters with a view to securing an amendment of the Act and the placing in operation a scheme which will enable the various forms of co-operative activity or marketing institutions to carry out the functions for which they were called into being. Reference has been made to the financing of various crops. That is a function of the State at the present time, and many of the States are doing it, and I believe that the resources of a Commonwealth Bank should offer greater facilities in that direction with considerable advantage to Australia. That is the reason why Queensland placed her resolutions on the agenda paper for discussion, and it is interesting to note that South Australia has evidently been affected in the same way. I claim that one of the justifications of a Commonwealth Bank is the establishment of a means whereby primary production can be carried on successfully in Australia and whereby the necessary marketing operations of co-operative groups of primary producers can be financed.

Mr. BUTTERFIELD (*South Australia*): What the Chairman has said of Queensland is abundantly true of South Australia. Time after time our Treasurer has been forced, in the interests of the producers of South Australia, to guarantee them with some financial institution in order that they might be financed through the harvesting or processing of their various crops. We have had time and again to come to the rescue and pledge the security of the State in the interests of the Commonwealth Bank, and also other financial institutions, in order that our settlers might be assisted. Only during the last session we were successful in getting our Rural Bank Act passed in South Australia, and whether it is advisable to have a duplication or an extension of the Commonwealth Bank or the Commonwealth Rural Credits Act, or whether the better plan would be co-operation with the State Rural Bank, is not quite clear. But it does seem to me that in all our activities with the man on the land the State Government is the closer in touch. It is more easily reached and more sympathetic with the individualities of our settlers, and it does seem to me that in the final analysis the institution which is going to be of help to the producers of the country must be prepared to consider individual cases and analyse them as such. I agree with what the Chairman has said. Up to the present the Rural Credits Scheme of the Commonwealth Government has been an absolute failure. It has accomplished nothing. It has done nothing that a private or commercial bank would not do.

Mr. TROY (*Western Australia*): The Wheat Pool came to the State Government for a guarantee. It could not be arranged with the Commonwealth Bank. The State Government were willing to arrange a guarantee on certain conditions which might have been agreed to had not the Wheat Pool, in the meantime, obtained a credit from the Co-operative Wholesale Companies of Great Britain. They have been financed from that quarter ever since. All the financing of rural industries and much of the secondary industries in the Western State is done by the State by guarantee. Our Agricultural Bank has financed the whole of our agricultural settlement and some of our pastoral settlement, and the State has been compelled to assist mining by guarantees as well as by advances and also to assist secondary industries by guarantees as well as by advances. At one time the Commonwealth Bank advanced money pretty liberally to certain institutions for buildings, &c., but I do not know of any transactions under the Rural Credit Scheme at all. Everyone comes to the Government. If an industry is in trouble it is sent along by the banks to see if the Government will guarantee the risk.

The CHAIRMAN (Mr. Forgan Smith): It is a very undesirable state of affairs, because it means that under that system of guarantee the Government is taking all the financial risk and the bank is getting all the profits.

Colonel BOURCHIER (*Victoria*): We have not approached the Commonwealth Bank of recent years to assist us in connection with marketing proposals. We have a Bill modelled on the basis of the best of other Australian Acts dealing with rural

credit in course of preparation. Our Wheat Pool has been guaranteed by the Government. We did not approach the Commonwealth in that matter.

The following resolution was proposed and carried:—

"That the attention of the Premiers of the States be called to the failure of the Commonwealth Bank Rural Credits Branch to render practical assistance to producers and producers' organisations in the preparation of produce for market and the marketing thereof, and that representations be made to the Commonwealth Government in order to secure the necessary amendment to the Act to enable the Act to render such assistance."

IMPERIAL BUREAU OF ENTOMOLOGY.

Mr. ROSS (*New South Wales*): At the conference of Ministers in 1925, a resolution was passed recommending that the State Premiers should communicate with the Commonwealth Government in order to secure contributions from the Commonwealth and the States on a £1 for £1 basis for the Imperial Bureau of Entomology, the States to make their quota on the per capita basis. Prior to the 1925 conference, an agreement had been in existence for the previous five years by which the Commonwealth contributed £400 and the States £600 for this purpose. In the first place, the Commonwealth refused to increase its contribution, and further representations were made pointing out that there were precedents with the Bureau of Mycology, and also pointing out the benefits that they derived in connection with the Bureau of Science and Industry in the Northern Territory and the Mandated Territories. When this item was listed no reply had been received from the Commonwealth Government, but subsequently we were advised that the Commonwealth was prepared to contribute on the £1 for £1 basis for a period of one year only. The Minister desired that this matter should be brought before this Conference in order to secure the opinions of other Ministers on the matter, as to whether they proposed again to approach the Commonwealth Government for contributions on the £1 for £1 basis, or whether they proposed asking the Commonwealth Government to bear the whole expenditure.

The CHAIRMAN (Mr. Forgan Smith): You will remember that this matter was discussed very fully at the Hobart Conference last year, and the following resolution was carried:—

"That this conference recommends the State Premiers to contribute to the Bureau of Entomology in any future agreement on the £1 for £1 basis with the Commonwealth, and that the States' contributions be raised on the per capita basis."

The position is as outlined by Mr. Ross. The Commonwealth first of all refused to do anything, and then there has been the question of the amount. The position in a nutshell is, that the Commonwealth have been £100 short weighted on the basis agreed to by Ministers at Hobart last year. If we agree, the basis would be, briefly, this—

							Contribution.
Commonwealth	..	..	..	..	..	..	£500
New South Wales	..	..	..	..	..	..	192
Victoria	..	..	..	..	..	..	141
Queensland	..	..	..	..	..	..	71
South Australia	..	..	..	..	..	..	46
West Australia	..	..	..	..	..	..	31
Tasmania	..	..	..	..	..	..	19
							£1,000

That would be the contributions for the year. I think it is a very wise thing to keep in touch with this Bureau of Entomology, and the amount prescribed for affiliation and for receiving the returns and the result of their investigations is something that is worth while. There can be no doubt that the information which is obtained by this Bureau is of value to all agricultural countries in the world. The Commonwealth Government in one communication stated that the matter would be reconsidered when the Institute of Science and Industry was reconstituted, and it has agreed to contribute for one year apparently with the view of having the whole matter reviewed by the Institute when properly established. I suggest that we carry the resolution that we carried at the last conference, and I move accordingly.

Mr. TROY (*Western Australia*) seconded the resolution, which was carried unanimously.

International Institute of Agriculture, Rome.

Mr. BUTTERFIELD (*South Australia*): Steps should be taken for establishing in the different countries of the world places where propaganda can be issued so as to make the Institute better known, for the purpose of strengthening the relations with it and obtaining generous contributions to the endowment fund. The members of the Institute should carry out propaganda work when in foreign countries.

Professor PERKINS (*South Australia*): It has been suggested that local branches representing the Institute at Rome should be formed in each State. The idea is to ascertain if the other States are agreeable to the suggestion. It does not involve any financial commitments.

The matter was referred to the Agricultural Committee for discussion and report.

Agricultural Research.

A proposal for representation at the conference to be held in England in respect to the question of the co-ordination of agricultural research throughout the British Empire was referred to the Commonwealth Institute of Science and Industry.

A similar proposal in respect to the World's Third Poultry Congress at Ottawa, Canada, in 1927, was negatived.

POWER ALCOHOL.

The CHAIRMAN (Mr. Forgan Smith): This matter has been placed on the agenda paper because of its importance to Australia. It has been the subject of a Bill in the Commonwealth Parliament granting a bounty for power alcohol produced from cassava. The manufacture of power alcohol is a matter of far-reaching importance to the Commonwealth of Australia. Internal combustion engines are becoming a very important feature of modern industry and consequently supplies of liquid fuel are of paramount importance. Up to the present time natural oils have not been discovered in Queensland or Australia generally, although the geological indications are favourable to the discovery in oil-bearing country. We are dependent on importations from overseas for our liquid fuel. One can readily understand, therefore, that any failure to secure those supplies, due to disturbances which might arise, would leave Australian industry in a very bad way. Motor traction is a very important factor in modern industry and on our farms.

In Queensland we have entered into an arrangement with a British Company, which has supplied certain data to the Government and which has, in conjunction with the Plane Creek Sugar Mill, formed a company for the distillation of power alcohol. The factory is now under construction in the Mackay district and will probably be ready to commence operations about the beginning of next year. It is proposed to use molasses, a by-product of the manufacture of sugar, for power alcohol production. A ton of molasses will produce something like 60 gallons of liquid fuel. Naturally there is not sufficient molasses available to keep the factory going or to enable it to enter on production on a large scale, and it has been suggested by the company that we interest ourselves in the cultivation of cassava, which may be utilised, in conjunction with other starch-bearing crops, to keep the distillery going all the year round. Power alcohol can be produced from cassava, sweet potatoes, and quite a large number of other crops that can be grown readily in Australia. The whole matter to be decided is whether it can be economically produced. The problem is not so much one of chemistry but of ordinary business economics. You must be able to pay the producer a fair price for his crop and extract the alcohol at a cost that will enable it to compete with imported fuel.

Cassava is recognised as one of the best products for that purpose, and our Department has introduced cassava from Java, and areas are now under crop in the Mackay district, under quarantine and under Departmental supervision, and for the purpose of supplementing molasses at that distillery. It is probable that other distilleries will be established in Queensland sugar districts at no distant date. At the present time we can produce more sugar in Australia than is required for Australian consumption and any surplus is exported at a severe loss to the industry when it enters into competition with sugar grown by cheap coloured labour elsewhere. No Australian can continue indefinitely producing crops at an unremunerative price. In the sugar mills the first boiling of the juice after crushing the cane produces from 60 per cent. to 65 per cent. of sugar, and at the present time in order to extract all the obtainable sugar from the juice another two additional boilings are often resorted to. It has been suggested from the first boiling we could obtain enough sugar for Australian requirements, and the resultant juice could then be utilised for the production of power alcohol and the sugar, plus the alcohol, would provide a remunerative price for the sugar-grower. Complete experiments will be made at the Plane Creek Mill and it will be established as to what can best be

utilised for this purpose. The Commonwealth has granted a rebate in excise in connection with power alcohol produced from cassava, and a very interesting experiment is being conducted in that way. I feel sure that we are on right lines, and, if anticipations are realised, at no distant date we will be producing in Queensland large quantities of liquid fuel from the by-products of sugar-cane and also from other starch bearing crops. It is thought that there are crops other than cassava of high starch content that might be economically employed in the production of power alcohol, and the suggestion is made that experiments be carried out in each State with crops that offer promise in this direction. Arrangements could also be made for the treatment of quantities of these crops at the distillery at Plane Creek with a view to determining the commercial prospects of the industry in other States. That is to say, the company that has been established locally is prepared to conduct experiments with any crop that is suitable for the production of power alcohol and the Ministers for Agriculture, through their chemical bureaux, might give some attention to this matter. There is a very big market for the fuel if it can be economically produced. It is definitely established that it can be produced successfully from molasses. The treatment of other crops is really more of an economic problem.

Colonel BOURCHIER (*Victoria*): It is most essential that every support should be given to experiments in this direction. There are vast quantities of oil and petrol in different parts of the world, but there is no doubt that in time the supplies must diminish, and it is a safeguard to ascertain the value of alcohol or spirit such as has been mentioned by Mr. Forgan Smith. It is very interesting to know that experiments are being carried out in Queensland with regard to this product, and any investigations or experiments that can be carried out in any of the other States to test this out more fully should be carried out. It is well worthy of every consideration and support.

The CHAIRMAN (Mr. Forgan Smith): We tried power alcohol from cassava in some of our cars, and the chauffeurs of the Works Department spoke very highly of it as a fuel for motor cars. We have large cars conveying stone and building material from the quarries and so on, and one chauffeur informed me that it gave that extra punch that is so often necessary in going up hill, and it is quite a satisfactory fuel for motor cars.

Mr. BUTTERFIELD (*South Australia*): Experiments are being carried out, or have been carried out, in South Australia by the Government Analyst, and he is quite sure that from a ton of ordinary beet straw 70 gallons of fuel can be obtained. The question of economic production has to be solved. There should be more money spent in research in connection with such an important matter as this. I am at one with the Chairman, and I am sure that his statement of the position as applying to Queensland is valuable to all of us and it will stimulate similar investigation in other States.

The CHAIRMAN (Mr. Forgan Smith): We are prepared to give any State interested the results of our experiments and to help them in conducting experiments. If you have starch-bearing crops that you would like tested in connection with their power alcohol possibilities in a practical way we will be prepared to arrange for those experiments to be made. What has to be done is to produce alcohol in sufficient quantities to be able to guarantee a continuity of supply, and it must be at a reasonable price. To put the matter on record I move—

"That it is desirable that the manufacture of power alcohol be encouraged from agricultural products."

The motion was carried.

NATIVE FUR-BEARING ANIMALS.

The question of an interstate agreement respecting open seasons for native fur-bearing animals and the ensuring of a continuity of supplies of fur skins was discussed.

The CHAIRMAN (Mr. Forgan Smith): This year Queensland has an open season for opossums, the first for three years, from the beginning of June till the end of July. Other States also have open seasons, and consequently there will be very large quantities of skins on the market. We may have occasion to decide to close the season for a number of years, and other States may do the same. Consequently there is no continuity of supplies and the market is not kept stocked. It occurred to me, therefore, that it might be a good thing if some arrangement could be made between the States whereby that continuity of supplies could be assured.

Mr. Butterfield (*South Australia*): You collect a royalty?

The CHAIRMAN (Mr. Forgan Smith): Yes, and issue a license. Sometimes our open season may synchronise with that in another State, and the effect I have in mind, I think, is a good one if it can be achieved. Victoria and Queensland have

open seasons this year, and, although there will be no difficulty in selling the skins, both States may keep the season closed next year. Last year we had a close season, and there were inquiries from London and elsewhere about the opening of the season and consequent renewal of supplies.

Colonel BOURCHIER (*Victoria*): In Victoria for some years prior to this year we had close seasons, and owing to the great increase in the numbers of the opossums and their depredations we decided on an open season this year. Already very large supplies have been obtained, and even complaints have been made that the animals would be wiped out altogether. One of our difficulties is the poisoning of opossums by cyanide, and we have lost very large numbers of stock through that means.

The Chairman: We prohibit that.

Colonel BOURCHIER (*Victoria*): Although we have not prohibited the sale of cyanide we have tightened the legislation governing it.

Mr. TROY (*Western Australia*): We have a close season, and in some localities the trapping has been so severe that we have lost the opossum altogether.

THE MEAT INDUSTRY.

Provision of legislation to enable the Commonwealth Meat Industry Encouragement Act to be uniformly operative was discussed.

Colonel BOURCHIER (*Victoria*): My object in having this item placed on the agenda was for the purpose of hearing discussion from the various States on the question of the Commonwealth Meat Industry Encouragement Act. On several occasions I have been approached by the stock-owners of Victoria, urging that the Victorian Government bring in legislation with regard to this measure. Personally I was in favour of doing something to assist the industry, but I naturally desired to know what had been done in the other States. I promised the stock-owners that we would introduce legislation at a later date on lines to be laid down after further consideration had been given to the matter. I understand that what is required is a levy of so much a head on sheep and bullocks—sheep, 1d. for 500 head and the same amount for 100 head of bullocks. I think it is a good thing because, after all, we have to deal with the meat industry as we have to deal with every other industry.

Mr. E. GRAHAM (*Queensland*): In this State we have legislation but the benefits accruing from its operations have not been great. Some of the representatives on the board have left the State and others have relinquished their interests in the industry and forfeited their right to sit on the boards, so numerically the number on the Council is insufficient, and the interests represented have been undecided as to whether to ask for further representation on the Council and reconstitute the boards, or allow it to languish. Those interests have now been encouraged to make nominations to the board with a view to allowing the Council at its first meeting to take a ballot as to whether the Advisory Council shall continue in operation or otherwise.

The Queensland legislation is similar to that in other States. It was enacted prior to the Federal Act, and it is subsidiary to the Federal Act. It was passed by the Queensland Government and set aside until the Federal Act came into operation to synchronise with that Act. The object was to encourage the meat industry generally, and particularly the export of meat. The Federal Government gave a bonus to encourage the industry. It was thought that this organisation would be able to collect data and see that that bounty was distributed pro rata to the producers. It was also thought that the boards, working together and working under the Federal Government, would be able to institute inquiries as to market conditions overseas and as to the likelihood of developing the meat trade. A levy on stock is imposed by the Federal measure on all stock in States where the Act is operative.

Mr. Butterfield: Stock sold or stock held?

Mr. GRAHAM: On stock held—over 100 head of cattle and 500 head of sheep. The local boards are the collecting media for these funds, and they pass them on to the Federal Board.

The CHAIRMAN (Mr. Forgan Smith): The object of the Act was to encourage those engaged in the production of cattle for export to organise with a view to providing marketing facilities for themselves, and develop new methods of marketing and exploit possible new markets. That was the object of the measure and a very laudable one, but if the people interested are not prepared to help themselves then the Government cannot help them very much. We gave the cattle industry machinery for the improvement of their industry, but up to the present it cannot be said that it has been utilised to the fullest extent. That is due to certain obvious

economic reasons. On the Commonwealth and State advisory boards certain interests are represented—the interests of the cattle grower and the interests of the meatworks. The meatworks at the present time purchase the cattle on the hoof, for which they pay a given amount per 100 lb. dead weight. They are the sole authority as to the classification or grade of the meat. Of course, the Commonwealth has its inspectors at the meatworks who grade for export under various schedules, but on the actual purchase the meat companies lay down what the price shall be and they are the people who determine its classification. They purchase the meat outright and reap the advantage of any improvement in the market overseas. Some of the graziers have gone into the question of having stock treated on owner's account by the meat companies with a view to getting any advantage the market may have in regard to any increase, but the companies are not favourable to that proposal, and where prices have been quoted for treating cattle on owner's account they have been higher than what appeared to be a business proposition on the part of the owner. As a result of the cleavage of interests on this Council—that is, the interests of the cattle grower who wants as good a price for his meat as he can obtain and the interests of the meat export companies who want to get that meat as cheaply as possible—not much benefit has resulted. The thing is very complicated by the fact that the meat companies have large plants which only operate during a portion of the year, and consequently their overhead costs, spread over the twelve months in the year, are very high indeed. The cattle owners have made certain suggestions about acquiring abattoirs to engage in the meat export trade themselves and also to send chilled meat to the South.

Our scheme, as pointed out by Mr. Graham, is financed by a levy on stock—sheep and cattle—above a certain number held by the stock raiser. The idea of the scheme, both Federal and State, is a sound one, but like everything else it depends for its success on the co-operation of those interested. Some people, particularly some of the large cattle growers, for some reason or other have failed to give the scheme the support they might have done. That is due in some instances to the operation of vested interests who are able to exercise control in countless different ways. You know how co-operative efforts that affect vested interests are often scotched by influences operating through financial circles in countless different ways. In Queensland, Mr. E. T. Bell has done yeoman service in connection with this work. He is Chairman of the State Advisory Board and also Queensland representative on the Federal Board. He has done wonderfully good work in attempting to organise the meat industry to take advantage of this scheme, but he has received a good deal of opposition from quarters in which one would naturally look for support. I am inclined to the view that the State Advisory Board should be empowered to take a vote as to whether those engaged in the cattle industry require a continuation of the scheme or not.

Stock Brands and Earmarks.

Mr. BUTTERFIELD (*South Australia*) moved—

“That it is desirable that uniformity should be secured between the States in relation to brands and earmarks.”

Mr. W. Forgan Smith (*Queensland*) seconded the motion, which was carried.

Butter Exports to Canada.

The CHAIRMAN (Mr. W. Forgan Smith, *Queensland*) moved—

“That the attention of the Commonwealth Government be called to the imposition of a dumping duty by the Canadian Government on Australian butter, and that every endeavour be asserted towards the removal of this duty.”

Colonel BOURCHIER (*Victoria*) seconded the resolution, which was carried.

Dried Fruit Marketing.

It was unanimously agreed—

“That the attention of the Institute of Science and Industry be called to the necessity for investigating the methods of preparation for marketing of currants and sultanias in Greece and Smyrna.”

UNIFORM MARKETING LEGISLATION.

The setting up of an authority in each State (with provision for farmer representation) to be responsible for the initiation of projects designed to bring about better marketing and general improvement in the Agricultural industry was discussed.

The CHAIRMAN (Mr. Forgan Smith, *Queensland*): The idea is to enable some system of uniformity between the States which will be mutually advantageous to the producers and consumers in the States concerned. At the present time some difficulty arises in respect to section 92 of the Constitution which provides for free trade between the States, and consequently, where we have organised marketing as between one State and another, its objects can be defeated by means of other interstate activities. We can see the necessity for some form of co-ordination in regard to marketing legislation. Then, again, we readily understand economic conditions operating in one State while they do not operate in another. We in Australia, as a Commonwealth, have devised a tariff for the deliberate purpose not only of fostering and prospering our own industry, but also with the purpose of enabling certain Australian standards of living to be maintained within the Commonwealth, and that protection is given so that these standards shall not be menaced by being brought into competition with the products of countries that have not adopted the same high standards. The same thing holds good with regard to the organisation of marketing within the State. Bear in mind that the main object of organised marketing is to give those engaged in production marketing control of the product, and to enable them to get all that there is in an industry without its being exploited or being made the subject of speculation by any intermediary body. In addition to that, another important function is the maintenance of regular supplies. It is not desirable in the interests of the users of an article to have glut periods at one stage and a scarcity at another. Regular supplies and stabilised prices are both in the interests of the producer and consumer; violent fluctuations in quantity or price are detrimental to the interests of both. Consequently regular marketing along those lines should be of importance and all the State action should be uniform. These movements must naturally be initiated by somebody. I am a firm believer in people organising themselves and doing something to help themselves in connection with the problems which concern them. As was pointed out when we were discussing the question of the Meat Industry Encouragement Act, the success of any scheme depends on the intelligent co-operation of those whom the scheme is intended to benefit. There can be no Messiah to lead the producer into the promised land. He must take action to organise his industry on an efficient basis and take control of the marketing of his product. The history of co-operation is illustrating and illuminating in that respect. It shows difficulties in the beginnings; difficulties that have to be overcome by steadfastness of purpose and intelligent application to the problems that concern them. And co-operative organisations, both in this and other countries, have produced the men who are required to cope intelligently with the situations which may arise and manage generally their affairs. Dealing with the initiation of these projects, it is necessary to have some body that will take the lead in the promotion of any proposal which may be desirable in the interests of marketing and co-operative effort generally.

Queensland System.

We have made provision for that in Queensland by means of the Primary Producers Organisation Act, whereby we have organised the farmers through various bodies and they have executive control in what is known as the Queensland Council of Agriculture. Each section of the agricultural industry has control of its own business, but the central council is the body charged with the responsibility of dealing generally with matters which affect all agricultural interests within the State, and being elected representatives of the farmers in the several portions of the State, they can be readily assembled to discuss any project which is of general agricultural interest, and form a valuable connecting link between the producer and the Government of the day. The Council takes the initiative in many projects which may be considered wise by them in the welfare of the people they represent. It is the body that consults with the Government and through which various forms of activity are set in motion, and it also forms the nucleus of the body which later on controls the commodity when the organisation has been set up. I believe that institutions of this kind should be encouraged by all State Governments. These are days of organisation. All industries should be organised and placed on an efficient basis, and agriculture, not only in its own interests but also in the interests of the State, should be among the number. It should be organised and responsible bodies should be set up in each State that are capable of controlling co-operative effort and activity, and of initiating projects and discussing with Governments matters of mutual welfare.

Mr. TROY (*Western Australia*): I admit that you have done a great deal in Queensland in regard to the organisation of the primary producers. My experience is that if you can prove to producers that such legislation is for their good they adopt it, and you cannot prove it until you have the system in operation, as you have in Queensland as a result of legislation and consequent conferring of statutory powers. I am satisfied that under other conditions we could accomplish

in our State or in other States what you have accomplished in Queensland, but we have no desire to run the whole of the farmer's business. We want to give him the opportunity of education. We have in Western Australia a very successful voluntary wheat pool, but that pool would never have been established had it not been for the experience gained by the wheat grower through the previous establishment of a compulsory pool. If you want the farmers to agree to pools of this character, you have got to give them a lead, and when you can prove that the whole thing is right they will follow, but you cannot give them a lead, you cannot show them the way, without legislative authority.

A Tribute to Queensland.

Mr. BUTTERFIELD (*South Australia*): I feel that in Queensland you have done marvellous things in regard to the betterment of the farmers' conditions. I do not agree that it is necessary to wait till the farmer becomes wise, because, after all, that is not what we conceive as education. Education means the existence of that essential—a teacher. When the farmers realise that they are going to gain they are quick to grasp a benefit. We have need to do more to bring home to the minds of the producing community what are their needs, and I am hopeful that that will be done. I think it can be said without any political inference whatever that Queensland has done wonders. Queensland has attempted more than has been done in other States and has been successful. There has been no authority set up in our State with power to investigate and initiate projects. You must first set up an authority. That is the basis or ground work with respect to any attempt at co-operative marketing for the benefit of the producers. A Government should look for able, competent men, men who are connected with interests involved, to determine certain processes which can be applied to the achievement of something better for the producers. That cannot be done by any individual producer. It can only be done by a board appointed to inquire and recommend. I can see from my short visit to Queensland that immeasurable benefits have been extended to the producers of this State, and they can be extended in any other State by Governments that are so inclined. I am strongly in favour of setting up some authority as defined in every State, and I for one shall go further into the matter with the intention of doing something on behalf of the producers of South Australia. Co-operative effort unless supported by the Government of a country is often apt to result in failure, because there are often initial difficulties which only a Government can surmount, and there is always special knowledge on the part of some person or body of persons required to make success assured. If vested interests find that they are going to lose a little profit by efforts at co-operation they will always oppose such a scheme in order to conserve their own interests. Self-preservation is the first law and they naturally look to protect themselves. We have done a good deal to assist co-operation in our State, but the assistance has been mainly financial.

The CHAIRMAN (Mr. Forgan Smith): I move—

“That the conference affirms the desirability of setting up an authority in each State (with provision for farmer representation) that will assist in the initiation of projects designed to bring about better marketing and general improvement in the Agricultural industry.”

Colonel BOURCHIER (*Victoria*): I am strongly in favour of co-operation between the States with respect to marketing projects, but I am not quite sure what is meant by this resolution. It states that we affirm the desirability of setting up an authority. I take it the Government in each State is the authority, unless it is proposed to establish a board or council or something else.

The Chairman (Mr. Forgan Smith): Each Government would do what it thought right itself. The idea is to give some responsible authority—a Board, or, say, a Council of Agriculture—the duty of which would be to investigate and initiate projects calculated to benefit the producing interests, that would mould them into shape and be a kind of advisory body to the Government.

Colonel BOURCHIER (*Victoria*): I strongly approve of the principle.

The Chairman (Mr. Forgan Smith): I would not approve, and never have approved, of any Board being established with powers that should be held only by a responsible government.

Colonel BOURCHIER (*Victoria*): In our State the question of marketing projects is dealt with by the Minister for Agriculture and Markets. I am in favour of Commissions being appointed temporarily to go into these matters. We have the State Rivers and Water Supply Commission in Victoria. We have our own Department of Agriculture, and on the question of markets, I find it advisable, on

occasion, to refer a matter to a body constituted by persons very closely affected for report. I cannot say that I am in favour of setting up a permanent board. That is purely a matter for the State concerned. I find it works quite well to appoint a representative board when the occasion demands. I am strongly in favour of farmer representation, and, with regard to all the boards in those activities which has been established in Victoria, we lay down that farmers and producers shall be represented on such boards. Take, for instance, the Fruit Board; the Soft Fruits Board; the Dried Fruits Board—the growers are represented on all those boards. We also have the voluntary Wheat Board, upon which the growers are represented.

Quite recently we have amalgamated the Co-operative Meat Freezing Works of Victoria under one central body, and we have the directors of the various companies represented. Right through, so far as the State of Victoria is concerned, we believe that the primary producers should be represented on these boards.

FODDER CONSERVATION.

The question of a national scheme of drought insurance by means of adequate fodder conservation involving collaboration between the Commonwealth and State Governments was discussed.

The CHAIRMAN (Mr. Forgan Smith): This is a matter to which every Government has applied itself from time to time. Drought insurance is a matter of vital importance to every State in Australia, and if a proper scheme can be drafted and put into operation it would be of incalculable advantage to Australia.

If a scheme could be successfully launched for a period of years it would represent an excellent business proposition in itself, and the indirect advantages to a State would be enormous. In a period of drought not only must the losses of stock and the losses in the value of potential crops be assessed, but in addition it affects every avenue of human activity within a State. There is a serious diminution of flocks and herds which reacts immediately on revenue. In addition to that the curtailment of spending power decreases the volume of general commerce. The existence of drought means a shrinkage of income and a general serious decline in the spending power of the whole community.

These points suggest the magnitude of the problem. It is not my purpose at the moment to put forward any definite scheme. The problem is much too big for any far-reaching scheme to be discussed in anything like detail at a conference such as this. It would mean a long and serious consideration by a body of experts who would have to work out details in a manner that would bear complete investigation. The general basis of the problem is one which should engage the attention of this conference, and it might be valuable to have the views of Ministers on the matter.

A national scheme means a nation-wide scheme. It is a matter that affects the interests of every State, and it is a matter also that directly affects the Commonwealth. It affects the revenue; it affects industry; it affects wealth production in the Commonwealth; and the idea is that some form of collaboration could be brought about as between the State and Commonwealth Governments for a comprehensive scheme embracing the whole of Australia. That would be desirable. Then it is national as distinct from the producer only. At the present time if the pastoralist or farmer or grazier is affected by drought indirectly everyone in the community is affected. Any insurance scheme would naturally ask who are to be the payers of the premium, and then the question arises, if a scheme were prepared that appeared to be sound, who would provide for the cost of it? Would it not be a fair thing for the States out of their general revenue to pay a proportion of the cost as well as the producer directly? That is also what is meant by national.

Mr. M. F. TROY (*Western Australia*): Fodder conservation in Australia has been largely neglected in the past, but the several States are doing something at the present time, and if financial resources were available to enable a scheme to be tested on a large scale then we would very soon get the requisite data to determine whether it could be conducted on a still larger scale. We need, first of all, more railways, because in a large territory such as we have there is an abundance of feed in one portion while there is a drought in another.

Any scheme of fodder conservation must be accompanied by a scheme of education among stockowners themselves. No stockowner knows when the inevitable drought will happen. If any stockowner were to conserve large quantities of fodder he would naturally carry a greater quantity of stock to compensate him for the expenditure incurred, and he arrives at the same position in the end—he overstocks. So any scheme of this character cannot be determined superficially. It must be thoroughly investigated.

MR. BUTTERFIELD (*South Australia*): In years of plenty the people of Australia are very apt to forget the seriousness of their position at critical times. It is desirable that something should be done on the lines set out.

Colonel BOURCHIER (*Victoria*): Everything possible should be done by the States to assist in the direction indicated. Victoria is not in quite the same position as the other States, because although we certainly do have droughts like the rest of Australia—and some very severe ones—we are, perhaps, in a more fortunate position owing to the fact that we have a very large area under irrigation. I think it amounts to 1,500,000 acres. We are continually irrigating—pushing out the channels into the drier areas, and thereby insuring the State against the ravages of drought.

MECHANICAL MOISTURE PRECIPITATION.

The practicability of the control of moisture precipitation by mechanical means was also considered.

Mr. GRAHAM (*Queensland*): To my mind this is a very easy matter to deal with. As to the technical work connected with it I have nothing to do, but I would call attention to the importance of its consideration. I think you will agree that as regards the production of crops and other vegetation the greatest amount of energy, effort, and scientific thought has been directed towards the improvement of the soil conditions by the addition of artificial manure, and to the purity of seeds and other factors that go towards high production; but even when all these things are perfect the main essential is moisture, which is the over-riding factor in determining the yield of the crop. This question of moisture affects both the agriculturist and the pastoralist. It affects the pastoralist outside even the influence of drought. Many of our holdings are only stocked up to one-fifth of their capacity, and we may say that if we were assured of a rainfall we could increase our sheep three times and still be assured that no losses would occur through over-stocking. In other States irrigation and other methods of water conservation have been resorted to. I think that an analysis of the irrigation schemes throughout the world will show that they are not profitable from a strict financial point of view; the amount returned is not adequate to pay interest on the capital expended. It does seem possible as the result of man's increased knowledge of the atmosphere and his control of flight that a greater and deeper scientific investigation could be made. I claim that Australia is very properly suited for the carrying out of these investigations. We have some regions that register a rainfall equal to any in any other part of the world, and on the other hand there are portions where the rainfall is scanty. I suggest that this matter be given further consideration and that the question be referred to the Council of Scientific and Industrial Research, and I ask that that Council make it as one of its major subjects for investigation, and that it be not shelved as something quite impossible.

Dr. CAMERON (*Victoria*): Many attempts have been made to produce rain by mechanical means. There are other parts of the world that are more drought-stricken than Australia. The scientists have failed. There is no ground whatever arising from experience and for believing that with the present state of scientific knowledge further attempts are worth while. Rain precipitation is caused by an enormous natural force, but the only force it is conceivable that men could apply would be infinitesimal. This has been a subject for perennial discussion, and the highest scientific opinion on the subject throughout the world is definitely against the feasibility of mechanical rain precipitation.

Mr. TROY (*Western Australia*): I think we should leave this matter to people who devote the whole of their time to this form of investigation. We have a scientific research department in Australia and the matter comes within its province. I do not in any way deprecate the motion, but we should confine our attention to the matters that have brought us here.

Mr. GRAHAM (*Queensland*): It has been stated by a very eminent scientist that such a thing is within the realms of possibility; in fact, in laboratory tests he has brought about the artificial precipitation of moisture, and has declared before a body of scientists that the matter of control of mechanical precipitation of moisture would be within the grasp of man in the future. When the subjects dealing with aviation and wireless were mentioned, it was stated that such things would never be accomplished. The Bureau should give this matter further consideration, scrutinise the possibilities of such an invention, and if they agree that the matter cannot be accomplished, then they can let it go. Scientists have stated that it is within the grasp of man, and seeing it is such a big factor in agriculture the problem should be investigated.

The Conference proceeded to discuss the Committee's reports.

REPORT OF THE AGRICULTURE COMMITTEE.

The General Agriculture Committee submitted the following recommendations and reports in respect to agenda items on which it had conferred. Each recommendation and report was approved and adopted by the Conference:—

1. Permanent Standards for Wheat.

Recommendation.—“This Sub-Committee recommends to the Ministers of the several States that the State Departments of Agriculture be asked to confer with the recognised agricultural organisations in the wheat-growing States on the matter of standards designed to facilitate the more profitable marketing of wheat and the improvement of the quality of wheat for export.”

2. Determination of Milling Quality of Wheat, and Method of Determining the Value of Flour and Wheat.

Recommendation.—“The Sub-Committee recommends in connection with these two questions that further research is required before any change is made in the methods of estimating the flour strength of wheat.”

3. Uniform Grade Standards for Eggs in the States, and for Export.

Recommendation.—(1) “That the Commonwealth Government be requested to provide in the Commerce Act Regulations that the Australian brand for export eggs be “Emu,” and that the minimum pack permitted for export should average 2 oz. per egg, with a minimum weight of individual egg of $1\frac{7}{8}$ oz.

(2) “That for the Australian trade, the Departments of Agriculture of the respective States should make efforts to induce producers to grade their eggs in packs with a range of 1 lb. per long hundred (10 dozen) between them.”

4. The Adoption of a Uniform Standard of Copper Carbonate.

Recommendation.—“That further tests regarding the physical and chemical composition of copper powders for the prevention of bunt be conducted by the chemists for agriculture in all the wheatgrowing States, and that on the matter of fineness of grinding and density the Berkeley methods be provisionally adopted in such tests; and further, that Mr. Sutton be authorised to conduct correspondence with the Berkeley authorities with the object of securing the apparatus required to have the tests conducted on uniform lines, and also to discuss with the chemists in each State, methods of investigation to be uniformly undertaken by them.”

5. Finalisation of Recommendations made at the 1924 Conference of Chemists relative to Fertilisers, Fungicides, and Stock Foods.

Consideration of the Regulation Methods of Analysis in connection with the Provisions of the Fertilisers, Fungicides, and Stock Food Bills drawn up by chemists at the Ministers' Conference in 1924. (Motion withdrawn at 1925 Conference.)

6. Uniform Fertilisers Act. (Motion withdrawn at 1925 Conference.)

Recommendation.—“That in the event of amendments being introduced in any legislation relating to stock foods, seeds, fertilisers, fungicides, or pesticides in any State, such amendments should, as far as possible, be framed in conformity with provisions of a like character in Acts already in operation in other States.”

7. That it is Advisable to have “Chlorocide” Admitted to Australia Duty Free.

8. That it is Advisable to have a Remission or Reduction of Duty on the Admission into the Commonwealth of “Paradichlorobenzene.”

Recommendation.—“This Committee recommends to Conference that the importer be advised to prepare a case and submit it to the Tariff Board, asking for remission of duty on ‘chlorocide’ and ‘paradichlorobenzene’ imported.”

9. Uniform Seed Legislation.

Recommendation.—"The Committee reports to Conference that after discussion it is found that in the States which have Pure Seeds Acts, these are reasonably uniform in their provisions."

10. Methods of Examination of Imported Seeds and Grain.

Recommendation.—"That the Federal Authorities administering the Quarantine and Commerce (Trades Description) Acts, who are considering draft proclamations regarding this matter, should be asked to submit a copy to each State for consideration."

REPORT OF THE DAIRY COMMITTEE.

The CHAIRMAN (Hon. W. Forgan Smith): You will notice that some of the matters dealt with in this report are outstanding from the last Conference—some suggesting no action be taken, and others that the Commonwealth be approached, and so on. I would suggest that these be taken in globo and approved. The Conference agreed.

Standardisation of the Grading and Examination of Dairy Products placed on the Interstate and Intrastate Markets.

Recommendation.—"That the Commonwealth Government be asked to reconsider its decision in respect to the standardisation of the grading and examination of dairy products for the oversea, interstate, and local markets by the allocation of the work of grading to State officers and the supervisory work of standardisation to its own staff, on the lines submitted to it by the Conference of Ministers of Agriculture at Perth in 1922 and reaffirmed at each Conference since. Failing action being taken on these lines, this Committee recommends that the States themselves take the necessary steps to bring about standardisation of the grading for the interstate and intrastate trade."—Approved.

Visit of Dairy Expert to Europe.

Recommendation.—"That it be a recommendation to the Governments of the States to send an officer overseas to investigate dairy matters, the expenditure involved to be borne by the different States on a production basis." Conference agreed.

Co-ordination in Experimental and Research Work.

Recommendation.—"That the States co-operate in experimental and research work relating to the dairy industry by advising the controlling officer of each State of action proposed and/or taken, so as to give an opportunity to collaborate and assist."—Conference agreed.

Australian Dairy Organisation Scheme—Commonwealth Representation.

The CHAIRMAN (Mr. Forgan Smith): The Australian Dairy Organisation scheme adopted in 1922 provided for Federal official representation on State Dairy Boards and the Australian Dairy Council. From 1922 to 1925 these boards and the council confined their attention principally to overseas dairy produce export matters. In 1925, the Commonwealth Government passed the Dairy Produce Export Control Act, whereby a board was appointed to advise the Minister on matters relative to export. This board superseded the export section of the Australia Dairy Council's operations. The council now intends to devote the whole of its efforts to matters in connection with production, education, manufacture, home markets, &c., all of which are exclusively of internal and domestic concern to the various State Governments. At the last Ministers' conference it was resolved that on any export board established the State Governments should be adequately represented. The Commonwealth replied that the request would be considered in the event of any amendment

of the existing Export Control Acts being contemplated or of legislation being introduced for the establishment of any additional boards of this description. However, no further action in the matter has been taken so far.

Mr. McINNES (*New South Wales*): This matter was brought forward to consider what action should be taken in connection with the continuation of Federal representation on the Australian Dairy Council. We have no suggestion to make on the matter as it is a question of policy.

The CHAIRMAN (Mr. Forgan Smith): I have here a memorandum from my Chief Dairy Expert:—

“It is suggested that the question of State representation on the Dairy Produce Export Control Board be again brought before the notice of the Commonwealth Government, as we consider it in the interest of the industry that the State should keep in touch with all boards functioning in association with the various bodies connected with this industry.”

Mr. TROY (*Western Australia*): It is vital that the States should have representation on the Dairy Export Control Board, because the States produce the commodity which is exported. The Minister in each State should keep in touch and know what is being done and how it is being done. I move:—

That the States ask for representation on the Dairy Export Control Board.

Colonel BOURCHIER (*Victoria*) seconded the motion, which was carried.

Compulsory Installation of Tried and Approved Machinery.

Recommendation.—“That the three largest producing States, New South Wales, Victoria, and Queensland, arrange for the appointment of a Joint Committee to investigate the efficiency of dairy machinery, with a view to issuing a joint certificate of efficiency where such machinery is found satisfactory.”—Approved.

Uniform Specification for Thermometers.

Recommendation.—“That the States approve in principle of the suggestion submitted by New South Wales, and recommend that the various departments discuss the matter of uniform specification for thermometers used in connection with the manufacture of dairy produce, taking the New South Wales regulations as a basis.”—Approved.

Uniform Herd-Testing.

Recommendation.—“That clause 12 of the original draft of the Official Australian Pure Bred Herd-testing Production Scheme be amended by the addition of the following words: ‘Unless there is being carried out a system of daily weighing as a check on the official twenty-four hours test.’”—This resolution was carried by the Committee by three votes to two.

In view of the conflict of expert opinion, the Conference discussed the recommendation at length and finally approved of it.

Preservatives in the Manufacture of Butter.

Recommendation.—(1) “That further investigation be made with a view to ascertaining methods of manufacture or treatment of butter to improve the quality and overcome undue deterioration without the use of boric acid.

(2) “That the States under Item 20 undertake to examine in detail the methods put into force in New South Wales to manufacture butter without the use of boric acid, and report any decision they may arrive at to the various Departments of Agriculture.”—Approved.

Purification of Water for Butter-Making Purposes.

Recommendation.—That the investigation of the purity of water used in the manufacture of butter is considered advisable: Such investigations to cover a bacteriological examination of all butter wash water used in all factories where inferior butter is made from untainted cream.”—Approved.

REPORT OF THE FRUIT COMMITTEE.

The recommendations of the Fruit Committee respecting marketing of the prune crop; standard grades for bananas; grading of apples and pears; grading of canned fruit; apple and pear grades for overseas export; uniform legislation dealing with fruit tree stocks; application of uniform grades for nursery fruit trees; investigation of methods of control of fruit tree diseases; reaffirming the advisability of fixing uniform grade standards for every kind of fruit in all States; oversea fruit exports; that reports be made available to the States by the Commonwealth Government on the prices and conditions of fruit arriving at English markets—were all approved.

Other recommendation approved were:—

Arsenic Sprays.

“That owing to the action taken by the British authorities in respect to apples and pears imported into the United Kingdom which have been treated with arsenic sprays, it is requested that the Commonwealth Government, through the Bureau of Science and Industry, carry out research work in the control of the codlin moth, with a view to the discovery of a method of control which does not involve the use of arsenic.”

Suggested Commerce Regulation Amendment.

The amendment of the Commerce (General exports) Regulations 1925—

“Fresh fruit shall not be exported if it is affected with San Jose scale or has been in contact with fruit so affected, or has been produced in any orchard where San Jose scale is present.”

was suggested. The Committee recommended that the Conference request the Commonwealth Government to modify Regulation 46 of Statutory Rules 22, 1926, by deleting all the words after the word “scale,” making it read, “fresh fruit shall not be exported if it be affected with San Jose scale”; and that Note 3 (prohibited exports) on p. 37 of Statutory Rules, No. 22, 1926, be altered accordingly.

Other agenda items in respect to oversea marketing of citrus fruits; development of oversea markets for citrus fruits, and question of compulsory export; the question of prohibiting the sale of immature or dry citrus fruits on the local market, and of the export of immature fruit; and grade standards for citrus fruits; the necessity of the continuance of the Citrus Insurance Fund; of the continuation of export bounty on sweet wine; and inspection of wine for export—were affirmed.

Destruction of Starlings and Sparrows.

The Committee regretted that it was unable to suggest any practical method of dealing with starlings and sparrows, other than by systematic poisoning.

CONCLUSION.

The CHAIRMAN (Mr. Forgan Smith): I thank you, gentlemen, for your attendance at this Conference, and declare its closure. I wish to say, on behalf of Queensland, that we appreciated the holding of this Conference in Queensland. As Minister for Agriculture, I appreciate the opportunity of having you here to discuss the several important agricultural matters on the agenda paper which are of interest to the agriculturists of the Commonwealth. I also wish to take this opportunity of thanking the daily Press for the publicity that they have given to our proceedings. Many important matters have been dealt with, and I feel sure that the Conference has been a success; that the conclusions arrived at on important matters are wise conclusions, and when given effect to, as no doubt they will in due course, will result in that benefit that was intended to be achieved when initiated by the several members of this Conference. The next assembly will be in Adelaide, and I am sure that the departments concerned will take the opportunity of giving effect

to these resolutions and that the result of their experience will be made available to the other States, and at the next annual conference we shall be able to report that many of our decisions have become effective with advantage to the people whom we represent.

Mr. BUTTERFIELD (*South Australia*): I rise with the endorsement of everyone here—Ministers and officials—to move a hearty vote of thanks to you, Mr. Forgan Smith, in the first place for presiding over this Conference, and in the second place as representative of the Queensland Government, for the very fine consideration that all visitors have received at your hands. We all appreciate very much the consideration that has been shown to us and our friends in every possible direction since we entered your State. We have met with hospitality from our entry into Queensland until now, and there promises to be a continuation of that hospitality until we depart. You can take as genuine our appreciation of what has been done for us, and I am sure we will all go back with happy memories of our contact with you during the last few days. I have much pleasure in moving—

“That a hearty vote of thanks be accorded to Mr. Forgan Smith for his presidency over this Conference.”

Colonel BOURCHIER (*Victoria*): I have very much pleasure indeed, on behalf of myself and the officers of the Victorian Department, in thanking you, Mr. Forgan Smith, for the hospitality extended to us during our stay in your State. This has been one of the most instructive conferences that I have had the pleasure of attending.

Mr. TROY (*Western Australia*): I feel it a privilege to support the motion, and wish to express on my own behalf and on behalf of the officers who have accompanied me from Western Australia, our thanks for the magnificent hospitality that you have showered upon us since our arrival in your State. I wish also to express our thanks to Mrs. Forgan Smith and the other ladies in Queensland who have given up so much of their time to entertain the ladies who accompanied our party. I hope that you will be able to attend the next Conference at Adelaide, and that when we again come to Queensland we shall have the pleasure of again sitting as a conference with you, Mr. Forgan Smith, as Chairman. I have very much pleasure in supporting the motion.

Mr. G. D. ROSS (*New South Wales*) and Mr. H. C. SMITH (*Tasmania*) also supported the motion, and referred to the capable way in which the Chairman had conducted the proceedings.

The vote of thanks was carried enthusiastically.

The Value of Annual Conferences—Public Service.

Hon. W. FORGAN SMITH (*Queensland*): On behalf of the State of Queensland and the officers of my department, I thank you very sincerely for the cordial manner in which you have carried that vote of thanks. It has been a pleasure to us to have you all with us. I believe that these Conferences, as some speakers have pointed out, do a great deal of good to agriculture generally, apart altogether from the decisions which may be reached. The departmental officers at the discussions at the sub-committees gain the benefit of the experience of other officers engaged in similar services, and use it no doubt in the carrying out of their own duties. It is a privilege to have been associated with the several officers of the departments at this and the previous Conference. I am satisfied that they are men who carry out their duties with zeal and an abounding desire to do well for the country in whose service they are engaged, and that spirit of public service is one which should be prized by all citizens who love their country. Service is a matter which is often overlooked in dealing with public affairs. Ministers and their staffs are engaged in a great public service in shaping policy and administering the affairs of the State. When successful they add to the well-being of their fellow citizens, and that brings about a recompense which cannot be assessed in terms of cash. At the next Conference, I am sure that we shall have a very hearty reception in Adelaide, and the same thing applies to the other State in which Conferences will be held subsequently. I am glad that some of the Ministers will be able to visit North Queensland, and I wish to say in conclusion that I appreciate very much the opportunity I have had of presiding here. I acknowledge my indebtedness to my own departmental officers and the other officers who have contributed to the success of these proceedings. I wish you all the best of success in your duties, and I hope that the results of the Conference will be to the benefit of those engaged in agriculture and the Commonwealth generally.

Dr. CAMERON (*Victoria*) moved a vote of thanks to the Conference secretaries, Messrs. R. P. M. Short and Alex. Henry, and paid a high tribute to their work.

The vote of thanks was accorded most cordially, and the Conference closed.

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations, Brisbane, has received the following report (28th June, 1926) from the Entomologist at Meringa, near Cairns (Mr. E. Jarvis):—

Successful Control Measures Against Termites.

During March, 1923, we were asked by growers in the Burdekin district to institute experimentation against the so-called giant, or thick-winged termite (*Mastotermes darwiniensis* Frogg.), which at that time was said to be causing serious damage to cane, and although, fortunately, of local occurrence, was thought to be on the increase.

Preliminary laboratory experiments in this connection indicated that cane sets could be rendered proof against white ant attack if dipped before planting in a solution of Paris green $\frac{1}{2}$ oz., water $2\frac{1}{2}$ pints. Further research along similar lines, however, was soon abandoned in favour of such control methods as fumigation of the soil around affected stools of young plant cane; dipping the ends of sets in repellent solutions; placing poison-baits in or close to termite-infested stumps, posts, roots, &c.

Our efforts during the last few weeks have been directed against the nest or termitarium, and the discovery of simple methods of destroying it; a phase of control which aims a blow, as it were, at the source of the trouble, giving one a chance to destroy simply and inexpensively in the one operation many thousands of individuals, including workers, soldiers, and nymphs, together with the queen-mother of the community, who never leaves the nest; being in fact little more than an animated machine designed for ejecting a constant supply of eggs; amounting, it is said, in the case of some of the African termites to many thousands each day during a period of several months.

The internal structure of the termitarium built by these insects usually consists of innumerable thin plate-like woody-looking or papery fragments of irregular form and size, arranged in a compact mass, which being open or well aerated is very suitable for treatment with fumigants. Among those just tested by us, ordinary Shell benzine and calcium cyanide were the two that gave best results. The former of these fumigants has been found effective in South America against *Leucotermes tenuis* Hag., which is said to be the most important termite in Brazil.

The following brief notes on our methods of application and the results secured are supplied by Mr. J. H. Buzacott (Assistant to Entomologist), who took part in this branch of experimental work:—

12th May.—One half pint of Shell benzine was poured into a hole in the top of a mound. The hole was 6 in. in depth, and sealed after the injection. Nest was opened two days later, and a 95 per cent. kill observed. All the surviving ants were soldiers, and the queen was found dead in her cell.

26th May.—A large mound, 5 ft. in height, was treated at a depth of 2 ft. with 1 pint of Shell benzine. On 5th June the nest was dug, and 100 per cent. kill had occurred. The smell of benzine still strongly pervaded the interior of the nest.

26th May.—Two nests were treated, each with 2 oz. of calcium cyanide. In the first it was placed at a depth of 2 ft. 6 in., whilst in the second it was placed just inside a cavity at the top of nest. The hole was sealed with mud in each case. Opened on 5th June a 95 to 97 per cent. kill had occurred in each mound, and the calcium cyanide was found to have decomposed entirely. Where the calcium cyanide had been placed near the surface the masses of dead ants were observed surrounding the dose.

The termites concerned in the abovementioned experiments were *Eutermes vermoni* Hill., and a species of *Termes*, the former insect being destructive at times to cane sets, although not attacking the sticks above ground level. Experiments in the Burdekin district against *Mastotermes darwiniensis* Frogg., which we had intended carrying out last April, were postponed for the time being; but it is hoped to test the value of several forms of control in connection with this white ant in the near future.

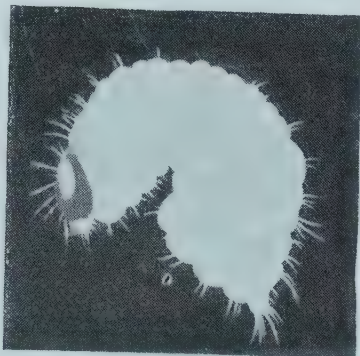
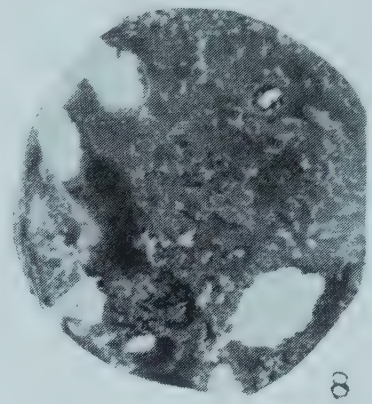


PLATE 7.

Fig. 1. Tachinid Fly Parasite (magnified).
 Fig. 2. Weevil Borer (natural size).
 Fig. 3. Larva or Grub of same (nat. size).
 Fig. 4. Larva of same (magnified).

Fig. 5. Pupa of same (natural size).
 Fig. 6. Pupa of same (magnified).
 Fig. 7. Weevil Borers attacked by fungus.
 Fig. 8. Sections of cane bored by Weevil.

Notes on the Habits and Economy of Tachinid Flies.

In view of the fact that despite liberations of the parasite *Ceromasia sphenophori* effected from time to time by us at South Johnstone some of the growers there are suffering severely from the cane-borer (*Rhabdoenemis obscurus* Boisd.), it would be interesting to point out the reason for the present activity of this pest in the above district. Exceptional opportunity has apparently been afforded these borers for multiplying abnormally on various areas of standover grub-infested cane during the last couple of seasons, and probably in sticks of burnt rejected cane, either left standing or lying on the ground in canefields or against tram lines.

Seeing that the life-cycle of this weevil (from egg to beetle) occupies no more than three months, any cane showing the slightest evidence of infestation should be cut as early as possible, and on no account be left to stand over. When such cane is crushed, thousands of larvæ, pupæ, and beetles are necessarily destroyed; which otherwise would continue breeding, and have a chance to produce two or more additional broods of beetles to infect subsequent crops of cane.

Economic Value of Tachinid Flies.

Among the different controlling factors employed by us to check the numerical increase of this beetle, first place must be accorded to its dipterous parasite *Ceromasia sphenophori*, which when it has once secured a footing in affected districts is generally able to keep the cane-borer in subjection, thus rendering the employment of artificial remedial measures unnecessary.

On areas around Moolaba and Babinda, for instance, it has now become so firmly established that puparia of this parasite may be easily obtained at any time in canes harbouring grubs of *obscurus*.

It is interesting to note that Mr. F. Muir, Entomologist, reporting from Hawaii in 1924, states:—"The introduction of the Tachinid *Ceromasia sphenophori* has led to a great reduction in the numbers of *Rhabdoenemis obscurus*, but where the Tachinid does not yet occur the weevils still do great damage to sugar-cane."

Factors Checking its Increase.

One of the chief causes tending to check or prevent the breeding of this useful parasite, or its establishment after liberation in a district, is an indiscriminate burning of the cane.

This kills any larvæ or puparia that may be in the sticks, the flies naturally suffering a severe check, while in some cases nearly every specimen may in this way be destroyed over extensive areas of cane land. At Japoon, for example, in the South Johnstone district, during February and October, 1924, these parasites were reported by our Field Inspectors to have practically got the borer under effective control, and on one of the farms visited where Tachinid flies had been twice liberated it was hard to find any borer-affected cane. In August of the following year (1925), however, it was reported that during this interval of ten months, the occurrence of a large fire throughout the Japoon area had destroyed these Tachinid flies, and borers were then found to be increasing in consequence.

An important organism exercising a natural control over this parasite is the entomogenous fungus (*Empusa* sp.). During the occurrence of damp atmospheric conditions associated with high temperatures favourable to germination of the spores of this fungus, such as occur in the wet season, great numbers of Tachinid flies sometimes perish in our breeding-cages, seemingly as though suddenly smitten by some virulent disease. Tachinids attacked in this manner become encrusted with a whitish mould (spores of the fungus) and are found in the field adhering with legs extended to the surfaces of leaves, &c.

Additional but far less serious checks on the increase of these parasites are effected by various predaceous enemies occurring in our canefields. Amongst such may be mentioned lizards, frogs, jumping spiders, ants, &c. Unfortunately *Ceromasia sphenophori*, unlike the watchful house fly, happens to be very unwary, sometimes even not taking to wing until nearly touched with one's finger.

Owing to this habit, some of the liberated specimens probably fall an easy prey to insect enemies. The common little ant, *Pheidole megacephala*, which is abundantly present in most of our Northern canefields, doubtless attacks Tachinids emerging from puparia formed in cane sticks before their wings have had time to grow and become fit for use.

Digger-Wasp Parasites from Java.

On 14th June four living and two dead specimens of the Scolid wasp, *Triscolia rubiginosa*, were brought to this office by Mr. Hunter Freeman, of the Colonial Sugar Refining Company, who has just returned from a trip to Java. This insect is

parasitic on grubs of *Xylotrupes gideon* L., a Javanese beetle closely related to our so-called Elephant Beetle. These digger-wasps, which consisted of one female and three males, together with an egg and a cocoon, obtained from parasitised grubs of *X. gideon* during transit, were handed over to this Experiment Station by Mr. Freeman, in order that we might determine whether this wasp will attack grubs of our cane-beetle *Lepidodermæ albobirtum* Waterh. The female insect was at once placed in a suitable cage of soil containing a large grub of our grey-back beetle.

Seeing that *rubiginosa* is a much bigger parasite than *Campsomersis tasmaniensis* Sauss. or *radula* Fabr., which destroy grubs of *albobirtum* in Queensland, there is not much likelihood of the former digger-wasp proving serviceable against our notorious cane-beetle. In all probability, however, this Javanese parasite will be found to attack larvæ of the Elephant Beetle, *Xylotrupes australicus* Thomp., which may serve as a host on which to breed numbers of the parasite for experimental work in the laboratory.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

BY EDMUND JARVIS, Entomologist.

Look after Parasite of Cane-Borer.

It is time that our growers began to understand that every Tachinid fly liberated by the Bureau of Sugar Experiment Stations amongst their borer-infested cane is worth many hundreds of times its own weight in gold. The Tachinid in question, for example, was introduced into Hawaii in the year 1910, and fifteen months later had become established in several canefields. We learn from the Hawaiian Sugar Planters Association that one of these plantations "reported an increase of 0.98 tons per acre in average yield of sugar for the 1913 crop which would mean a saving of \$75 to \$90 per acre, according to the prevalent price of sugar. Where the plantation was harvesting 1,000 acres, this would equal \$75,000 to \$90,000 for the plantation. A further increase of 1.25 tons per acre was reported for the 1914 crop, which would more than double the above annual saving." Now, it should be possible for us to secure similar increases as a result of such liberations, but we cannot expect to do so unless these parasites are carefully looked after and given a chance to multiply. Indiscriminate burning of the cane in which they have commenced to breed is one of the chief causes of failure to establish them. (See official report for May to June, 1926, in July numbers of "Queensland Agricultural Journal" and "Australian Sugar Journal.")

Another Good Grasshopper Bait.

The following poison-bait, recommended by an American entomologist, has been found a simple, effective, and exceedingly cheap remedy:—

Sawdust	100 lb.
Sodium arsenate	1 quart
Molasses (crude)	1 gallon
Salt	5 lb.
Water	7 to 10 gallons

Apply this at rate of 10 to 20 lb. of wet bait per acre (according to amount of grasshoppers present). (See also Hints for June, under "Combating Grasshoppers," in the two abovementioned Journals.)

Ants Nesting Against Cane Stools.

Accounts have come to hand from two or three growers at Innisfail and on the Tableland regarding the activities of a small yellow mould-building ant, which is thought to cause minor injuries to cane roots. When formed around a stool, its nests should be fumigated with carbon bisulphide or benzine, injected at intervals of a few inches apart, and three or four from the base of the canes.

When occurring between the rows, benzine could be sprayed on to the nests, which should then be covered over with a layer of moist soil. A 2 per cent. solution of lysol, or a 10 per cent. solution of cresyl has been found effective for the treatment of ants' nests. A splendid poison-bait for laying in the vicinity of these insects as traps, is obtained from the following ingredients:—

"Four hundred and seventy-three parts by weight of white sugar; 2 of sodium arsenite; 0.61 of tartaric acid; a little sodium benzoate and colouring matter boiled together in water; the amount of water being kept up as it evaporates to maintain a total of 1,000 parts by weight."

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received from the Assistant to Pathologist (Mr. N. L. Kelly) the following report (29th June, 1926):—

SHORT DESCRIPTION OF MAJOR DISEASES.

Leaf Stripe.

This disease occurs in a small part of the Bundaberg district, and in nearly every cane district north of this.

Symptoms.—The most noticeable feature is, usually, the presence of long stripes running from the base of the leaf to the tip. These stripes are light yellow when young, becoming dark brown as the tissues die. They vary in width very much, and alternate somewhat irregularly with normal green tissue. The critical symptom, the presence of a white mould beneath the leaves, is very noticeable in spring and summer, but not so obvious in winter. The mould will form, however, on keeping the leaf in a warm moist space for twenty-four hours. In the early stages the stripes work up from the leaf sheath to the tip. Later the young leaves are formed narrower and have the mould under them as they appear. Finally, the young leaves come out very small and entirely yellow. The stalk has by this time become very "spindly," and one may see in an infected field odd stalks, taller than the rest, with long internodes and small yellow leaves with dead tips. In autumn and winter the leaf dies and splits from the tip into threads. Along the sides of these threads are to be seen, with a lens, many blackish spherical bodies—the resting spores. Thus the leaf-splitting stage is the one usually met with in winter.

Cause and Infection.

The causal organism is a fungus *Sclerospora sacchau*. Its methods of reproduction are—

1. In the warm weather, minute asexual spores (conidia) are borne at the tips of the threads (hyphæ) of the "mould" which is found beneath the leaf. These are only produced by night, and are spread either then or early next morning by wind or insects to other canes nearby, whereon they germinate if moisture be present.

2. As the cold weather approaches the resting spores (oöspores) are formed to tide the fungus over the winter. When the leaves split these fall to the ground, germinate on the advent of spring, and infect cane growing nearby. Having been distributed by wind, cultivation, and drainage, the percentage infection in this crop is usually much larger than in the previous one. Apart from these natural methods, the disease, as with the other major diseases, is spread by the planting of infected sets.

Control.—1. Eradication.—"Rogue" fields infected less than 5 per cent. during spring, to prevent the spread either by method 1 or later by 2. All severely infected fields should be ploughed out on harvesting. Plant a leguminous crop, or, at all events, thoroughly prepare the land.

2. Seed Selection.—Use only clean seed. If possible avoid all infected fields.

3. Resistant Varieties.—Q. 813 has been found to be a fairly resistant variety. It is best to plant a resistant variety in any field which has recently been severely infected. Return to other varieties later, if desired. This completes a synopsis of the five major cane diseases appearing in Queensland. Under certain circumstances, other diseases often assume importance.

Top Rot.

I made certain preliminary observations on this disease as occurring around Gin Gin, mainly in M. 1900 Seedling, though Q. 813 was also slightly affected. One field on a red soil hillside was infected to over 50 per cent.

1. No Red Streaks ("Queensland Agricultural Journal," May, 1926, p. 406) could be found on the leaves of any infected stool, no matter in what stage the disease was.

2. Of twenty-five infected stems twenty-three had normal roots and a fair to strong pressure of sap (root pressure). The remaining two were suffering slightly from "Foot Rot." The field has lately had abundant rain, but little heat, so that growth is almost at a standstill.

In this and, at this time of year, in most fields of M. 1900 Seedling, and, to a lesser extent, of other varieties, one or more sections of varying length are to be seen, pure white in colour, later turning purple. This is termed sectional chlorosis, and in itself is practically harmless. It is almost certainly secondary to the lodging of a raindrop or dewdrop in the rolled younger leaves.

Now in the Top Rot observed, one or more of the chlorotic sections in one or more of the younger leaves—usually not the youngest of all—first turns brown, and putrefies, and the putrefaction advances downwards towards the growing point. Where the brown rotting mass is in contact with other leaves, putrefaction of these also sets in. Blowflies often lay their eggs in the rotting mass at this stage, and several of their larvæ are soon to be found there. The putrefaction first attacks the stem a little to one side of the growing point. If the youngest leaves stave off attack for some time, the now lateral rot causes a slight bending of the stem, which may be followed by a “knife cut.” This was observed in 8 per cent. of cases. In the majority of cases, however, the youngest leaf and the growing point commenced to putrefy, thus forming a Top Rot. A spell of warm, dry weather apparently checks the disease and minimises the losses it causes.

Mosaic.

This disease is widespread in the Bundaberg district. The features of this disease were discussed fully in my last report. I might add that as every stool of Shahjahanpur 10 that I have seen is infected I can only conjecture the losses caused in this variety. The enormous infection and losses in varieties adjoining a plot of Shahjahanpur 10, however, should impress the grower with its undesirableness.

Gumming.

This disease is causing considerable losses in the Woongarra locality. It is also present on many fields in other sub-districts. The best means of combating the disease is for those whose farms show the slightest trace of “gumming” to obtain their seed from a clean area. The Gin Gin and Bingera Mill areas are, I have every reason to believe, free of “gumming,” though the same cannot be said, of course, as regards Mosaic. Of those fields I have seen, two of N.G. 15 are apparently free from “gumming.” As this variety is badly damaged by the disease, it is to be discouraged at present. The main factors to concentrate on are—

1. Take every precaution to obtain only clean seed.
2. Avoid knife infection by sterilising knives when in infected fields. Immersion for thirty seconds in a kerosene tin of hot water causes sterilisation of any adhering organism.
3. Plough out infected fields as soon as economically possible.

Foot Rot is causing considerable losses in fields (mainly of M. 1900 Seedling), in which the farmer suspects merely “dry weather.” These losses are minimised by a rotation cropping, preferably with a “legume” (pea or bean family). Rice bean is favoured in the North, and giant cowpea in the South (N.S.W.).

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (28th June, 1926) from the Southern Assistant Entomologist, Mr. R. W. Mungomery:—

In May the districts of Childers, Gin Gin, and Bundaberg were visited. In nearly all cases grub damage in these canefields had ceased, and no further injury is likely to result until the spring months.

Experiments at Childers.

Experimenting with paradichlor. in the Isis district against the grubs of *P. furfuracea* has been carried out this year under probably the worst climatical conditions that have prevailed for many years, and the results so far obtained give no data that is of use in showing any increase in tonnage of the treated plots over the non-treated or control plots.

After the excellent growing conditions that were experienced there in the early part of January, no rain of any decided help came until Easter (4th April), the

few isolated showers that fell during the intervening period yielding at the most about a quarter of an inch of rain, which very quickly dried up under the great heat that was experienced in February and March. The cane remained more or less at a standstill during those months and the standover cane in many cases died out.

Grubs of the common cane beetle *P. furfuracea* during those dry times went deeper down in the soil seeking moisture, and week after week as the top soil dried out they were found to be at a still lower level. In the case of spring plant cane that was grub-smitten and which had the characteristic yellowish appearance, grubs were found right below the parent set and out of reach of the roots; so that under these circumstances it was not surprising to find that the cane in the "grubby" areas, for a time, tended to "green up," for the grubs were no longer gnawing at the roots.

Following on this, it is interesting to note further the sensitiveness of grubs of this beetle to moisture, and during the light falls of rain a certain amount of water would trickle down the cane stalk, making a small wet patch at the base of the stalk, and if this soil were disturbed with one's boot by gently raking it aside, several first-stage grubs would be exposed to view.

However, this droughty season through which we have recently passed has been of use in testing the limits of fumigation, coupled with dry weather, that the young cane plant will successfully resist, and in the experiments with paradichlor., using $\frac{1}{2}$ -oz. doses on both sides of the cane-stools, it was seen that this fumigant in adverse seasons may have a harmful effect on the growth of the young plant, and a few of these plants succumbed to treatment. Like carbon bisulphide, therefore, it appears that its effect is much more injurious to cane the drier the soil, and until more information can be gathered concerning its effect in the Southern drier areas, it would be wisest for growers to use it when there is a good moisture content in the soil. Plant cane under 2 ft. 6 in. only was affected, while any over that size withstood its effects quite well, and the young ratoon cane also suffered no ill-effects. Cane that survived the paradichlor. application is now stooling out well, and presents a much greener and healthier appearance than that in the control plot, and it was found that the mortality of the grubs in the treated block of plant cane was almost 100 per cent. Next season, experiments will be carried out to determine whether smaller doses such as $\frac{1}{16}$ oz. will suffice.

The growers on whose areas these experimental plots were established are nevertheless pleased with results obtained up to the present, and are keen to give the fumigant, which is new to this district, further trials. Many of them are now experimenting on their own initiative during my absence, and I would like to impress on these growers, as well as others, the necessity for exact experimenting. Some are unable to get a proper $\frac{1}{2}$ oz. or $\frac{1}{16}$ oz. measure, but by using the lid of a cardboard matchbox, deep spoon (these are merely suggestions), or other instrument always holding a definite quantity, the exact dosage used can be found out if at any later date results are obtained by them which go to prove the efficiency of this fumigant for cane-grub control, and so the quantity that they have used per acre can be readily determined. Thus much useful information can be supplied to the entomologist, and incidentally to other growers, for it can be clearly understood that the depth and quantity of a dose of paradichlor. that suits one particular class of soil may have to be modified to suit another class of soil.

Activities of the Several Grubs.

In the Bundaberg district, third-stage grubs of *L. grata* in the canefields have finished feeding, but a good number were still to be found at the end of the month (30th May) on some newly-ploughed grass lands bordering the forest, where third stages as well as first and second stages were very plentiful. Grubs of *P. furfuracea* were very scarce in the Woongarra district.

In the Gin Gin district, all stages of *P. furfuracea* were met with, while *L. grata* was found chiefly in its second and third stages under the cane stools, but all were very cold and inactive after the heavy rain which fell on 23rd May in that district. Several of these grubs were diseased, and it is probable that should further rains supervene there will be a heavy mortality from disease in that district.

L. frenchi grubs of the third stage, which in the early part of the season had been very active at the Elliott Heads and Gin Gin, had ceased feeding and had gone deep in the ground to pupate.

FIELD REPORTS.

The Southern Field Assistant (Mr. J. C. Murray) reports (24th June, 1926):—

In the course of the month the cane districts of Waterview (Bundaberg), Bingera, Wallaville, and Nambour were visited. The cane for the greater part is making slow progress. Conditions of growth:—

Spring plant: Growing slowly. Healthy.

Autumn plant: Good strikes, slow growth. Healthy.

Ratoons: Slow growth, no great length of cane.

Standover: In fair condition, very slow growth.

Waterview.

Growers here have very satisfactory crops, taking the dry period into consideration. The soil, being richer in humus than the average Bundaberg farm land, has retained its moisture sufficiently to keep the cane growing moderately. Farmers have a fair weed growth in this locality which immediately becomes noticeable with the slackening of scuffling, also patches of Mosaic infected cane. However, great pains are being taken in plant selection, so that in a year or two this disease will have been reduced to a minimum.

The writer has identified about thirty varieties in this locality (there are probably more), those making the best showing being E.K.28, Q.813, H.Q.285, H.227, H.109, 7 R.428, and Q.855. The first named is doing very well here, and it would not be surprising if the farmers are not, before long, growing this variety extensively in soils of the class under review. E.K.28 was brought from Java in 1914 by the Bureau of Sugar Experiment Stations with several other varieties. It is extensively grown in the Dutch Indies, and gives a c.c.s. value from 14.5 to 16.5. H.227 is a variety that is continuing to improve. This cane was brought from Hawaii by the Bureau of Sugar Experiment Stations in 1917, and growers are recommended to keep it in cultivation.

Bingera.

These red soils have not the cane on them that the alluvial loams have. The volcanic earths dry up quickly if the rainfall is not well distributed. Cultivation without subsoiling in red soil creates a pan about a foot deep, and this also operates against the chances of the cane resisting a dry spell, as the roots cannot reach any moisture that may be in the sub-layer. Many growers of cane cannot see the force of having drains on high red land when the water gets away quickly, but there should be drainage for the following reason:—

If a "pan" is in existence, stirring the soil with a subsoil plough helps, since it loosens the soil deeper than the ordinary plough, thus enabling it to hold more water. But the loosened soil becomes compacted again in a few years: at best the results of subsoiling are only temporary. Under-drainage is permanent subsoiling; it takes away the water that has cemented the subsoil and permits the air to enter it, thus promoting all the loosening and mellowing influences of weathering. The value of this is illustrated on Bingera Plantation. Drainage, and especially under-drainage, is of greatest service upon land already under cultivation, but which is not yielding crops because of inequalities in the water supply.

Two cane varieties doing very well on the Bingera areas at the present time are Q.855 and Q.813. This latter is well known, being a Queensland seedling having Badila as one of its parents. These canes bear a considerable resemblance to each other, excepting that the Q.855 is more heavily waxed than the Q.813 and is a reddish-brown in colour.

Farmers in this area would find it advantageous to make greater use of green manure than they are doing. Analyses of these soils show a deficiency of nitrogen and humus. A crop of mauritius bean, yielding approximately 13½ tons per acre, will give 2½ tons of organic matter, 173 lb. nitrogen, 40 lb. phosphoric acid, 317 lb. lime, and 141 lb. potash.

Wallaville.

A big crushing is not anticipated here this season. Crops are light, growers having been unfortunate in not getting rain at the right time. The cane that came under observation was fairly healthy, however, and first class cultivation was noticeable. The farmers are recommended to try and meet the periodic setbacks by drought with more green cropping and drainage. It would pay at least one farmer well, if he had a piece of suitable land, to grow pea and bean seed exclusively for sale.

Cane varieties making the best showing in the district at present are M.1900, Malagache, Brown Goru, Q.813, and Q.H.285. The Goru is making a good showing on the river flats, and as some growers in Southern districts appear to be uncertain regarding the Goru canes, it can be said that N.G.24 is a greenish-brown to copper coloured cane, N.G.24A is the same colour, but with red stripes along the internode, while N.G.24B is a yellow to green cane.

Nambour.

There are fair crops in evidence, the ratoons making a better showing than was anticipated. No damage has so far been done by frost.

The Central Field Assistant, Mr. E. H. Osborne, reports (21st June, 1926):—

Proserpine.

About the third week in May this district was suffering very badly from dry weather, for after a fairly dry period at the end of last year only 20.81 inches had been registered (up to 2nd June) for 1926; the last eight weeks were rainless. One enterprising grower, Mr. E. Quod, whose farm is on the river, was irrigating his crop with a 6-in. pump, tractor driven.

The cane in general was faring badly, and the present estimate of 80,000 tons is a long way below last year's record crop of 104,000 tons. Practically no planting had been carried out, and nearly all ploughing had ceased, awaiting rain to moisten the baked soil. The general water supply was also very short. Despite adverse conditions as compared with last year, it was pleasing to notice how the town is steadily increasing in size and importance; several new shops have opened and it is pleasing to see the number of neat and well-kept cottages built within the past couple of years, emphasising the fact that the sugar industry is Queensland's best agency in promoting closer settlement.

Cane varieties were represented last year in the following proportions:—

Variety.	Per cent. of crop.
Q. 813	24.0
N.G. 15 (Badila)	18.7
H.Q. 426 (Clark's Seedling)	17.5
M. 1900	13.7
Goru	5.3
Malagache	5.1
D. 1135	3.9
Striped Singapore	2.4
Mixed and other varieties, including Q. 1121, Q. 114, Q. 116, B. 147, E.K. 28, Innis, &c.	9.4
	<hr/> 100.0

Of these Q. 813 shows 2.8 per cent. increase and Badila 5.6 per cent. increase upon the previous year's figures, whilst H.Q. 426 shows a decrease of 3.5 per cent. upon same. The increase in N.G. 15 is mainly through the new outside area recently planted, but the increase in Q. 813 is on account of the satisfaction that it is giving as a good striker, quick grower and good density cane at practically any period of the season. The decrease of 3.5 per cent. in H.Q. 426 is, on account of its being erratic to a certain extent, deteriorating in quality and growth. M. 1900 was practically grown in the same proportion as in the previous year and gave very good returns.

E.K. 28 was only grown in small areas, but gave so much satisfaction that many 10 or 12-acre paddocks have been planted out and will be harvested this year. All of these looked very promising.

E. 208.—A few stands of this cane were seen upon a Waterson farm, showing very promising growth and seemingly clear of Leaf Stripe (or Downy Mildew) which all growers know affect this variety so adversely. The owner, an experienced farmer from Childers, says that he knows the symptoms of the disease and will watch the cane very carefully, and only replant if the cane continues clean. He is also aware that though the plant crop may seem quite clean, yet ratoons the liable to be diseased, and thus provide the possibility of affecting other varieties, and inadvertently causing serious loss to the district.

As previously reported, extraordinarily high density returns are obtained from this variety in the Burdekin district, despite the fact that Downy Mildew is often noticed slightly in the plant crop, but very badly in the ratoons. What probably checks the disease there is, may be the fact that only a plant, and at most a first ratoon crop are harvested, before ploughing out; and after the fallow period care is taken to ensure clean seed being used. At Proserpine the tendency has been to harvest ratoon crops that should have been ploughed out long before, thus encouraging any disease that may be about. Further, in this report will be found notes that apply to B. 208 and Leaf Stripe.

Diseases.—So much damage had been caused by weather conditions that it was rather hard to find whether disease or the dry conditions had been the worse. Leaf Scald was, however, noticed to be very bad in some second ratoon (Green Goru) N.G. 24B.

In the plant crop a few stools were seen to be affected, while first ratoons showed it to a far larger extent, but in the present crop many of the stools had died right out and others are rapidly withering away. The owner was advised to plough out and after fallowing plant with a resistant variety, such as Q. 813. Mosaic was noticed in a couple of stools of second ratoons of Black Innis, whilst Leaf Stripe was seen in a couple of stools of first ratoons 7 R 428 (Pompey) upon the same farm.

These two stools were part of two 9-chain rows of this cane obtained from Mackay some two years ago, and as some other seed from there planted in the district was then showing "Stripe," the writer very carefully examined the two rows in question, but could find no trace of disease, and yet it is so apparent in the first ratoons. The owner, upon being told of the danger of its spreading, promised to grub the stools out.

It is most gratifying to notice that farmers in general are now taking a very intelligent interest in plant diseases. This is very encouraging to officers of this Department.

Pests.—As practically no early planting has been carried out the Chrysomelid grub or local wire worm has not done much damage this year. A great number of Shea-Oak trees have been felled along the river banks by growers whose farms have suffered from wire worms, the idea being to destroy the feeding ground of the Chrysomelid beetle. This had been done earlier in the year, and the results will be very interesting.

Cane Grubs.—Some slight damage from grubs was apparent, but under such dry conditions it is hard to say how much damage can be attributed to the grub.

Bowen.

This district was suffering very severely from a dry spell, for although 18.46 inches had been recorded up to 4th June, only 8 points had fallen in the course of the nine weeks prior to this date. Under such conditions the cane was dying on most farms, and as so far none had been planted for next year, the future of cane-growing locally is not at all bright. Mention has often been made that the irrigation plants in use are very small, quite inadequate to keep cane at its best growth in a dry time.

In a few isolated places the cane looked healthy, notably some 13 months old plant Badila of Mr. C. C. Boulter's. This had the benefit of a better watering than cane on most of the other farms.

The Northern Field Assistant, Mr. A. P. Gibson, reports (29th June, 1926):—

The Tully.

The Tully and Mossman Sugar Mill areas were inspected this month. The extensive Tully lands whence the local modern factory expects to derive its cane supply is sandwiched by wooded uplands, through which pass the Great Northern Coast and lesser gauge mill railroads. The great valley extends east and west, and for the greater part is of alluvial formation, having for its base decomposed granite. The general make-up of the soil is somewhat patchy; on the whole, it is not deep, and varies from clay to a coarse or fine grainy structure, according to deposition at time of inundations. Since my last inspection further areas have been denuded of their dense rain forest. Tracks some 2 chains apart have been cleared through the fallen and burnt jungle, sufficient to permit the use of portable trams. Men are undertaking to do the whole operation of brushing, felling, logging (after burning), holing, planting, replanting (if necessary), and freeing the crop of weeds to a stated stage, for prices varying from £24 per acre upwards.

The Crop.—Generally good coloured but very backward and surprisingly patchy. Two inches of rain over the previous week-end had freshened things. Some very satisfactory blocks of N.G. 15 (Badila) were observed on the deeper and superior lower Tully River deposits.

Farmers possessing shallow soils having a yellow grainy clayish subsoil are recommended not to plough too deeply. The surface soil probably would be improved by turning up this substrata gradually, when it will crumble and sweeten on exposure to the action of direct sunlight.

Drainage and Lime.—Liming obviously would improve some of the Tully sugar lands; it is not actually a plant food as is sometimes supposed. Its principal benefits are as follows:—(1) Aiding the decomposition of organic matters; (2) making available mineral plant foods; (3) chiefly acting on the soil by counteracting acidity and improving its physical condition.

Planting.—Too close planting in new scrub land is not recommended.

Disease.—Much has been written regarding diseases brought about mainly by ignorance, coupled with careless plant selection. Recently planted paddocks were found to be suffering from Leaf Scald. The parent block was inspected and the disease located, thus proving the immense importance of plant selection; this can only be brought about by the hearty co-operation of all concerned. Top Rot and the fungus which binds the leaf sheaths to the cane were noted.

Pests.—Termites (white ants), cane grubs, leaf hoppers are more numerous here than any other Northern sugar district; so is the Midrib borer. The Weevil borer at present is almost absent.

Tully estimate is as follows:—Tully Proper, 80,000; El Arish, 30,000; Silkwood, 25,000. Total, 135,000.

Mossman.

Seasonal.—Satisfactory rain fell up to the end of April, although 56 in. less than that recorded for the first five months of last year. May weather was decidedly dry; moderately warm days, coupled by delightful cool nights, were experienced. Light but welcome rain commenced to fall the fifth day of June.

Rainfall.	Jan.	Feb.	March.	April.	May.	Total.
1925	18.03	19.32	37.47	11.74	.04	86.60 in.
1926	12.82	4.94	8.71	3.96	.11	30.54 in.

The Crop.—The crop at first grew rapidly, but its progress later was retarded owing to the rather long stretches of dry weather. The area to harvest is greater, and the cane per acre is expected to yield a similar tonnage to that harvested last year. On the whole, the crop is looking well, more especially the plant cane, while ratoons are considered backward in comparison to that of 1925 season. Eighty thousand tons is estimated to be crushed for the coming season, but rain is required urgently to ensure this tonnage. Curling of the leaf is much in evidence, being very pronounced on cane growing in the shallower and drier textured soils.

Cultivation.—Motor tractors have reached a high degree of efficiency, and are playing an important part in speeding up and cheapening the cost of field work. Lately implements new to the district have been introduced. The Athens, a two-disc plough, is attached between the right front and rear wheel of the Fordson tractor; it is necessary to lengthen the front axle, thereby permitting its fitting. Farmers speak highly of their good work. Medium crops of Mauritius beans have been turned under with them, less turning space is required, and the discs are simply lifted when not in operation. The first rotary plough or pulveriser arrived in the district last week; this should prove an acquisition on a large farm.

Planting.—Planting was in progress. The cane drills are run out, having centres varying all the way from 4 to 5 ft.; these are too often made far in advance of planting, resulting in unnecessary loss of soil moisture. The injudicious practice of depositing whole canes in drills and cutting them into sets as they lie is still being carried on. This idea is condemned, mainly because diseased and damaged canes are more likely to escape notice. A guide for furrow-end planting on headlands is beneficial, thus reducing waste land cleaning and also improving appearance. The farmers here are great believers in plant soaking; this adds to the cost—plants are damaged. Altogether it is a very unnecessary practice when the fields have been thoroughly tilled and the soil moist enough for seed germination. Attention is drawn to the planting of pencil-like or weedy canes; these often germinate favourably, but

there is the tendency to produce like canes. The decadence of a variety may be brought about slowly by unintentional propagation of inferior seed, therefore such seed should be eliminated.

Manuring.—Opinions differ greatly regarding what, when, and how to apply fertilisers to plant cane. Soil analysis should aid us in pronouncing what to apply. Few growers manure and leave unmanured portions for comparison, therefore nothing definite is obtained. Accumulated experience rather favours applying at least one half of the mixture along with the plant in cane drill, for when the primary roots develop, they quickly assimilate the handy manure, thereby greatly promoting the crop growth, which naturally minimises the cultivation of the crop interspaces because of their earlier covering.

Varieties.—Many varieties are grown here, but various things have a controlling influence over this great and very important subject, such as soils, rainfall, air, and heat. The earth, its make-up, depth, fertility, and drainage determine to a large degree the variety most suitable. Secondly, variety qualifications such as high c.e.s., good cropper, ratooner, harvester, and one reasonably free from diseases have also a determining influence. The Mossman lands fortunately are benefited by a good rainfall; they are not deep, nor are they suitable for N.G. 15 (Badila), save in small pockets; however, the varieties considered suitable are as follows:—H.Q. 426, Q. 813, B. 147, D. 1135, E.K. 28, the Goru family, and 7 R. 28 (Pompey).

Last year 22.66 per cent. of the total crop harvested at Mossman was H.Q. 426. It yielded an average c.e.s. of 14.84—the highest coming to the mill. It is a good germinator, grower, and cropper on the medium lands, but is subject to disease.

Q. 813, a fair cropper and good sugar producer, is suitable for the somewhat shallower medium soils. Obviously it is an extremely shallow rooter, and in consequence suffers keenly when attacked by cane grubs.

B. 147 and D. 1135 are deeper rooters and hardier canes; the latter is more extensively grown in the area yielding a c.e.s. of 13.62. E.K. 28 and Pompey could be extended on the poorer classes of land.

Disease and Pests.—Leaf Scald and Leaf Stripe are the main diseases noted of any consequence. The latter is widespread; it is also known by “jump up,” so called because of the fact that affected canes quickly jump up above the surrounding healthy ones. This disease is very prevalent, more so in varieties B. 147, M.Q. 1, and D. 1135, although all more or less are affected, save Badila. It is recommended to plough out affected areas as soon as possible, and it is imperative to see that none of the old stubble left is alive, otherwise the next crop may become affected. A variety change would help reduce disease; most of the affected canes are now dying or dead.

Rats and the Weevil borer are destroying cane in places; so far, the destruction is very much less than previous years. Wild pigs sometimes raid adjacent hillside areas.

Clearing is going on at Rocky Point. Some of the well-drained black forest soils that overlie a brownish red substrata should grow cane, though at least £40 per acre would be required to prepare and plant such lands.

Port Douglas and Mossman depend on the successful running of the mill. The factory is capable of treating some 120,000 tons, but has not the surrounding good land sufficient to produce its profitable requirements. The tendency is rather a decreasing tonnage instead of an increasing one, due mainly to the poorer lands not being able to produce profitable crops at present cane prices, therefore it seems imperative that more and superior land is required for the profitable running of the factory. It would perhaps be possible to raise the cane tonnage per acre of this district by the following methods:—

- (1) More thorough cultivation prior to and after planting.
- (2) Assisting to restore some of the apparent depleted soil humus by the growing and turning in of green crops.
- (3) Study more the varieties suitable for the many and various soils and the eradication of diseases by judicious plant selection.
- (4) Some areas appear rather big for the grower, and weeds have overmastered the crop. A small farm well and wisely tilled is more profitable than a neglected big one.

Railroads.—The freeing of tramlines of grass, &c., is a costly item. The tramways have been extended further out into the Whyanbeel Creek and Saltwater area.

Arrowing.—Flowering of the cane is fairly general, D. 1135 and Black Innis perhaps being the worst.

Answers to Correspondents.

Piggery Management.

R.M. (Murgon)—

There is an old saying that "half the breeding is in the feeding," it is quite possible to reverse this and to believe that good results can only be expected from feeding when the animals carry good breeding. From a careful study of your letter, the Instructor in Pig Raising (Mr. Shelton) has but one line of action to suggest, and that is to dispose of your present stock of pigs, clean up the premises generally, fence in good-sized well-grassed pig paddocks, and start off afresh with another line of blood altogether. It does not pay to feed and handle stock that fail to develop properly and to give good results. It is only waste of time spending money on medicinal treatment when breeding is at fault, and it is quite evident from your letter that your pigs are not of a desirable strain. They appear to lack stamina and vitality and to be losing the powers of reproduction. Pigs can be tested with the Tuberculin test, but it is comparatively an expensive item and is unsatisfactory. Full details in regard to worm infestation will be found in the pamphlets forwarded, but it is almost impossible to free pigs of kidney worms by any method of drenching, for the worms imbed themselves in the fatty tissue surrounding the kidneys and in the kidneys themselves where they set up extensive inflammation. Kidney worms, or for that matter intestinal worms also, cannot be regarded as the cause responsible for paralysis of the hindquarters, though pigs heavily infested with internal parasites might go down in the back. It is evident also that your pigs are not receiving sufficient nutritious food and that the food is fibrous and somewhat indigestible. This is indicated by the sluggish action of the bowels and the lethargic condition of the animals.

China Wax Tree (*Sapium Sebiferum*).

F.W.T. (Ipswich)—

Mr. C. T. White, F.L.S., the Government Botanist, advises that your specimen is *Sapium sebiferum*, the China Wax Tree or Tallow Tree. It is also known as *Stillingia sebifera* and *Excaecaria sebifera*, but *Sapium* is the generic name used by the people at Kew. The Guide to the Museum of Economic Botany, Royal Botanic Gardens, Kew, contains the following:—"No. 453. Tallow from the seeds of *Sapium sebiferum* Roxb. largely collected in China for candle making. The seeds, which are enveloped in the tallow, are steamed, beaten, and sifted. The coarse tallow thus obtained is strained through a cylinder of twisted straw. The candles are usually dipped in wax, owing to the tallow becoming soft in warm weather."

Grass Identified—*Eragrostis curvula*.

"THYLUNGRA"—

The Government Botanist (Mr. C. T. White) has identified your specimen as *Eragrostis curvula*, a grass that is cultivated to a slight extent in New South Wales, and is also naturalised here and there in that State. Mr. White has, however, never previously seen a Queensland example, and the grass has evidently been introduced into Thylungra. Mr. E. Breakwell, in his "Grasses and Fodder Plants of New South Wales," remarks on this grass:—

"*Eragrostis curvula* does extremely well under cultivation, and has produced yields at Hawkesbury Agricultural College as high as 6 tons of green feed per acre. Owing to its drought resistance it was taken up by different farmers, and although it has been reported on favourably, both for drought resistance and for palatability, it does not seem to have taken on to any extent. Farmers of Taylor's Arm, Nambucca River, have found it an extremely useful grass for spreading over hillsides of poor country, and testify that cattle eat it very readily when it is young.

"Although *Eragrostis curvula* is looked on as a permanent grass, it seems to die out after a few years if subjected to hard conditions. New seedlings, however, are constantly appearing, and it could undoubtedly be maintained in a permanent pasture by allowing it to seed. Generally speaking, this grass may be recommended for spreading over burnt ashes in scrub country, of poor formation, where it will act as a good standby in times of drought."

Native Kapok (*Cochlospermum Gillivraei*).

A.W. (Bowen)—

Your specimen, Mr. White (Government Botanist) has advised, proved to be *Cochlospermum Gillivraei*, sometimes known as "Native Kapok." It is a shrub or small tree that occurs on the North Queensland Coast. The flowers are yellow, large, and rather handsome. It is commonly more or less leafless when in full flower. The cottony material surrounding the seeds has no commercial value except perhaps as a poor quality Kapok.

Lawn Grasses—"Blue Grass," "Texas Blue Grass."

R.T.B. (Brisbane)—

The Government Botanist (Mr. C. T. White, F.L.S.) has kindly supplied the following replies:—

1. What is the botanical name of the grass known locally as "Blue" or "Nundah" Couch?—*Panicum didactylum*.
2. Is this grass a native of Queensland or an introduced one?—Rather doubtful; now generally conceded to be a native, but overlooked until comparatively recent years.
3. Can it be germinated from seed, or only sod planting such as is usually practised?—Yes. But seed is rather unreliable.
4. Does the Texas Blue Grass (*Poa arachnifera*) adapt itself to the Southern Queensland conditions?—The only place in Queensland we have records of this grass growing is the Darling Downs. It would probably do well there and possibly also in the Lockyer country, but I am rather doubtful about its doing well on the coast. The grass has never become very popular, largely on account of its inability to set much seed.
5. Does the Texas Blue Grass spread only by subsurface "shoots," as is the case with *Poa pratensis* or *Poa compressa*, and is the leaf or the flag of a similar fine texture as the others of the *Poa* species?—As far as I know Texas Blue Grass is very much similar in growth to the Kentucky Blue Grass (*Poa pratensis*), but is of a larger and coarser habit. It is not used for lawns in the same way as the Kentucky Blue Grass. I have seen this latter grass doing well about Brisbane during the later winter and the spring months, but it seems to die out with the approach of the summer.

"Tar Tree" (*Carpus australiensis*)—N.Q. Bolly Gum (*Blepharocarya involucrigera*).

"C.P." (Cairns)—

The Government Botanist, Mr. C. T. White, F.L.S., advises that the tree known about Cairns as the "Tar tree" is *Semecarpus australiensis* of the family Anacardiaceae, a family of about 500 species, widely distributed over the tropics and subtropics of the world; a few species extend into the temperate parts of the world. A well known member of the family is the common Mango (*Mangifera indica*). Many of the species are characterised by the possession of a blistering sap. This is even noticeable in the common Mango, the sap of which has the tendency to blister the skin. The well known state of "Mango Mouth," in which small blisters occur in the soft parts of the mouth, is no doubt well known to you; this is caused mostly by the sap from the skin of the fruit. Two of the best known skin irritants are, of course, the "Poison Ivies" of North America (*Rhus toxicodendron* and *Rhus venenata*) which cannot be handled by many people without their skin coming out in a rash which takes a long time to heal. Some persons cannot even bear being near the plants, others are quite unaffected by them. The North Queensland Bolly Gum (*Blepharocarya involucrigera*) belongs to this family, and the sap of the wood, if it gets into cuts or wounds on hands, arms, &c., causes severe swellings and pains. The active principle of many of these Anacardiaceous plants has not been isolated, but it doubtless varies in different species, so that treatment would vary according to the species involved. In the poison Ivies of North America the poison is a sticky non-volatile oil which is slowly oxidised in contact with the air to a resin. Under such circumstances the treatment by ointment tends to spread the trouble rather than check it. The reason is that these ointments become almost liquid at body temperature and so dissolve the oil and carry it to other parts of the body. Well scrubbing with soap and water has been found the most effective treatment. Possibly similar treatment would prove best for those affected by the "Tar Tree," but on this matter we have no very reliable data.

Hoya Poisoning.

J.J. (Boompa)—

The Government Botanist (Mr. C. T. White, F.L.S.) advises that *Hoya* is poisonous at any stage of its growth. It is not known whether or not it is more toxic after rain. Mr. A. McGown, M.R.C.V.S., Government Veterinary Surgeon, has recommended the following treatment for affected stock:—1 lb. Epsom salts and 1 lb. treacle should be given as soon as the animal is noticed to be sick, which should be followed daily with 2 dr. potassium iodide dissolved in half a pint of water.

Green-topped Stringybark and White Stringybark.

M.L.P. (Toowoomba)—

The Government Botanist, Mr. C. T. White, F.L.S., advises that your identification of the specimens submitted is quite correct. No. 1 is the Green-topped Stringybark (*Eucalyptus hæmastoma* var. *micrantha*). No. 2 is the White Stringybark (*Eucalyptus eugenioides*), except the small dried fruits with seed pods. To understand the differences between the flowers and fruits of the two species it is necessary to know a little of the structure of the *Eucalyptus* flower. The petals are missing; one of their functions in the flower is to protect the interior parts (stamens and pistil) in the young stage; in *Eucalyptus* their place is taken by an "operculum," a little cap formed by the welding together of the calyx-lobes or sepals. The shape and length of both calyx tube and operculum, but particularly the latter, are important distinguishing characters between the species. In the Gum-topper Stringybark the operculum is short in comparison to the tube, thus the seed capsules are on long stalks and have a broad rounded ring. In the White Stringybark the tube and cap are more nearly the same length, thus the seed capsules are larger and on much shorter stalks, sometimes quite sessile "stalkless."

Eucalyptus.

O.V. (Wondai)—

The Government Botanist, Mr. C. T. White, F.L.S., advises that the leaves you submitted are not those of the Citron-scented gum (*Eucalyptus citriodora*), the tree which occurs about Gladstone and elsewhere, and which produces an oil of high commercial value. It is very difficult to name accurately leaves from young trees or stump shoots, but Mr. White thinks there is little doubt that your specimen belongs to the Red Stringybark (*Eucalyptus resinifera*). The yield of oil is rather low in this species (0.48 per cent.), but the cineol content is high, so the oil conforms to the requirements of the British Pharmacopœia. The price, however, of such oils is low, about 10d. in comparison with 6s. to 7s. for the oil of the tree from the Gladstone district.

Plants Identified.

A.B. (Townsville)—

The Government Botanist, Mr. C. T. White, F.L.S., advises that the specimens forwarded with your letter of the 24th ultimo proved to be—

1. *Asclepias curassavica*.—The "Milky Cotton Bush," also known as "Wild Oleanda," "Red Head," and "Wall-flower Cotton Bush." It belongs to a family—the Asclepiadaceæ—which contains a number of plants known to be poisonous. Eaten in quantity the present plant may prove harmful, but Mr. White has often seen stock trim the plants without ill effects following. It has been suspected, but nothing has been definitely proved against it by feeding tests or otherwise.

2. *Solanum torvum*.—"Devil's Fig." The substance you refer to as giving the chemical reactions for Atropine would no doubt come from the plant. If the sheep were eating the green berries, as possibly they would, ill effects would most likely follow. This is the plant Mr. White is inclined to suspect as the source of the trouble.

3. *Tremna aspera*.—"Peach-leaf Poison Bush," "Peach Poison," or "Wild Peach." This plant is generally regarded as one of our worst poisonous, but Mr. White has times without number seen stock feed very freely on it without any ill effects following. The plant at rather rare periods develops a prussic-acid yielding glucoside and when fed freely on by stock at such times may cause death.

Red Natal Grass (*Tricholaena rosea*).

L.G.A. (Cooroy)—

The Government Botanist (Mr. White) advises that the grass you forwarded is the Red Natal Grass (*Tricholaena rosea*); as its popular name indicates, it is a native of South Africa. It has been naturalised in Queensland for many years and is very abundant along railway cuttings, edges of cultivation paddocks, &c. It has rather a mixed reputation, many people speaking highly of it as a fodder. Mr. White regards it as, at best, of only secondary quality; it is also very easily pulled up by the roots, and does not stand heavy stocking. Breakwell in his "Grasses and Fodder Plants of New South Wales" says that where White clover has proved a failure, Red Natal Grass may have a distinct advantage when grown in conjunction with *paspalum* in providing an alternative food-plant. However, White Clover does well with you, and you have Rhodes, Prairie, and other grasses, which are superior to the Red Natal.

Tropical Plants.

F.B. (Koliyo)—

The Government Botanist, Mr. C. T. White, F.L.S., does not think that under Queensland conditions there is much possibility of any of the plants you mention being profitably grown here on a large scale.

1. Turmeric Roots and Cardamon Seeds.—These are not obtainable here so far as Mr. White knows, and would have to be imported. These products are imported principally for use in the manufacture of curry powders and condiments. The plants are grown extensively in India and Ceylon; the demand in Australia is limited.
 2. Yam Bean (*Pachyrhiza angulata*) is occasionally seen about Chinamen's gardens, &c., in North Queensland. It is grown as a green manure and also as a food, but the tubers are low in food value and do not appeal to the European palate.
 3. Cloves.—Seed would have to be imported.
 4. Pimento.—There is a tree in the Brisbane Botanic Gardens that seeds freely. No doubt we could obtain some for you from the next crop if so desired.
 5. *Parinarium Laurinum* (Fiji Oil Laurel).—Seeds would be difficult to obtain.
 6. Jute.—Seed would have to be imported from India.
 7. Breadfruit.—Plants might have to be imported. The better variety is, of course, seedless; it may be obtainable here, but inquiries would have to be made. The fruit is primarily a native food, and would have little general commercial value in Queensland. It must be used quite fresh and would not carry.
 8. Jack-fruit.—Growing fairly commonly in Queensland, but mostly as an ornamental tree; there is very little demand for the fruit.
 9. Betel-nut.—The demand is very limited. Seeds would have to be imported.
 10. African Oil Palm.—One is growing in the Brisbane Botanic Gardens, but does not seed. It occurs in one or two North Queensland Gardens and seed might be obtained from them. The possibility of this palm as a commercial crop in Queensland seems almost nil.
 11. Ramie.—This has been tried here but did not prove a commercial success.
- If you desire further information on these matters or other crops likely to take the place of cane, write to the Under Secretary of this Department. Your queries will be answered as far as possible.

Tree Identified (*Albizzia Lebbek*).

W.D.A. (Gatton)—

The Government Botanist, Mr. C. T. White, F.L.S., advises that the tree, of which you forward a specimen, is *Albizzia Lebbek*, the "Siris" tree of India. It is much planted in Queensland as an ornamental tree and stands dry conditions fairly well; on this account it is planted rather extensively in Western Queensland, particularly in the Central West, where it is commonly known as "Acacia." In the wild state the trees attain a good size, and the dark heart-wood seasons, works and polishes well. The leaves and twigs are said to be given as fodder to camels.

Queensland Flora—(*Alstonia*).

A.H.B. (Townsville)—

1. The best works on Queensland Flora are:—"Queensland Flora," by the late F. M. Bailey, 6 vols. Price 30s. the set. "Comprehensive Catalogue of Queensland Plants," by the late F. M. Bailey. Price 15s. The latter is probably the work you saw in Melbourne. It is really a profusely illustrated companion to the "Queensland Flora." As a general text-book you might find Mr. Cyril White's (Government Botanist) "Elementary Text-Book of Australian Forest Botany" of some use.
2. Mr. White advises that several species of *Alstonia* occur in Papua. The most common is *A. scholaris*, which occurs throughout the East, through New Guinea to North Queensland. In Queensland it goes under the name of "Milk Pine." Both the bark of this species and of *A. constricta* are, Mr. White thinks, now official in the British Pharmacopœia.

"Scented Top" Grass—*Chrysopogon Parviflorus*.

J.H.MeC. (Dalby)—

Your specimen has been identified by Mr. White as *Chrysopogon parviflorus*, the Scented Top. The local name is derived from the peculiar and rather pleasant scent of the seed head; this scent is very noticeable if the seeds are rubbed between the hands. It is a native grass, fairly common in some places, and is looked on as a comparatively good feed and fairly drought resistant. Horses and cattle are fond of it, but it is generally regarded as rather coarse for sheep.

Macadamia and Helicia—Queensland Species.

H.J.R. (Dundas, N.S.W.)—

Mr. White (Government Botanist) has kindly supplied this list of the Queensland species of the two genera referred to:—

MACADAMIA.

1. *M. ternifolia*. The "Common Queensland Nut" or "Bush Nut." In a wild state ranges from the Tweed River to the Dawson River.
2. *M. ternifolia* var. *integrifolia*. Much the same range as the normal form.
3. *M. minor*. Gympie district. This species possesses a very small nut; the nut was regarded as poisonous by the natives; it is bitter in flavour and contains a cyanophoric (prussic acid yielding) glucoside.
4. *M. Whelani*. Bellenden-Ker region, North Queensland. Most abundant in the "scrubs" (rain forest) of the Gympie district; the nuts are only eaten by the natives after prolonged immersion in running water.
5. *M. præalta*. Southern Queensland. Most abundant in the Gympie district. Nut valueless.

Excluded Species.—*M. Lowii*. I think this hardly separable from *Macadamia minor*.

HELICIA.

1. *H. Youngiana*. Known in Queensland as the "Spice Bush," from the scent of the flowers. Not uncommon in the scrubs or rain forests of Southern Queensland.
2. *H. Cribbiana*. Only known from one or two localities in North Queensland.
3. *H. ferruginea*. All "scrubs" (rain forests) from Brisbane to Cairns.
4. *H. glabriflora*. In "scrubs" (rain forests) from the Macpherson Range to the Eungella Range (Mackay district).
5. *H. Heyana*. Only known from the Bellenden-Ker region. Nut unknown.
6. *H. australasica*. Cairns timber district, North Queensland.
7. *H. diversifolia*. Atherton Tableland, North Queensland. The fruit is rather large, blue, and fleshy. It contains a pitted, stony endocarp, enclosing a pleasantly flavoured kernel. The other species of *Helicia* are valueless as nut producers.

Excluded Species.—*H. Nortoniana*. I cannot see how this can very well be separated from *H. ferruginea*.

WEANING THE PIG.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Among matters worthy of special attention on the pig farm is that dealing with the correct age at which to wean the pigs. There is no hard and fast rule that must be followed to ensure success, as the age at which to wean the pigs will depend largely on the system of management that is followed on the farm.

If it is intended (as it should be) that the sow is to produce two litters yearly, it will be necessary to wean the pigs as early as practicable in order to allow of the sow being mated in time for the next farrowing. For this reason, it is advisable to wean the pigs when they are eight weeks old. The sow carries her pigs for four months (the gestation period is usually 112 days), and suckles them for two months, making six months in all with each litter. In general the sow will come in season three days after farrowing, and every three weeks (or twenty-one days) after that, although it rarely happens that the sow will "show" as being "on heat" before the ninth week after farrowing, and it is at this ninth-week period when it is advisable that she should be mated to the boar.

Some breeders are able, in the case of a sow with a very small litter, to induce the sow to come "in season" by keeping her and her litter separated for several nights in succession at about the sixth week after birth or even sometimes at the three-day or three-week period. In cases of this description, it is sometimes an advantage to feed the sow more liberally after going "in pig" and to allow her to suckle her pigs for a longer period, but this system can only be recommended in cases where the sow has a small litter or where the sow is carrying plenty of condition, for the gestation and lactation periods are severe on the dam and impose a double burden on her at a time when she should be storing nutrients and building up her body generally in preparation for the litter to arrive and be suckled.

If the young pigs, when about three or four weeks old, are provided with a small trough (a concrete, steel, or block tin trough preferred) placed in some convenient spot where the sow cannot get at the trough, they will soon learn to eat and drink freely, and if they are also allowed good pasture, the process of weaning will not prove a hardship, nor will the pigs be checked in growth. The strain on the sow will not be as great either if the young pigs are handled in this way. Both sow and suckers should also be allowed an abundant supply of drinking water. If, on the other hand, care and attention are not bestowed on both sow and litter, and if the young pigs have to depend on battling and fighting at the trough for a mouthful of feed while the sow and perhaps other pigs are feeding, then the weaning period will be a very severe one on the pigs, and the sow will not do as well.

For three or four days previous to weaning time, the sow that is to be weaned off her pigs should only receive about one half of her ordinary ration; this will cause a decrease in the milk flow. It is usually then advisable to take the sow away from the litter, leaving the young pigs in the same pens or pasture that they have been accustomed to. These pens and pastures should be clean, sanitary, and of good area, and so be conducive to rapid growth and gain in weight.

The sow should be handled carefully until her milk flow dries up. Some breeders allow the smallest pigs to remain with the sow for a week or so longer after the largest ones have been weaned, and this practice is to be commended, particularly if the sow has an abundant supply of milk and has been rearing a large litter. At any other time, weaning might take place when the pigs are eight weeks old. It is a decided advantage, if it can so be arranged, to allow a small weakly litter to remain on the sow until the pigs are about ten or twelve weeks old, in order to give them the additional benefit of the sow's milk, but this will hardly be necessary if the young pigs have been taught to eat from a separate trough whilst still suckling the mother.

Young pigs should be given an allowance of lime-water in their milk or other food two or three times a week, they should always have access to a water supply, and should be provided with charcoal, bone meal, and wood ashes, as well as with a lump of rock salt to lick at their leisure.

Given these conditions, weaning should not check their development.

Further reference is made to the subject of losses due to weaning pigs at too early an age in a series of articles on marketing pigs in Queensland, copies of which, with other information relative to the industry, can be obtained on application to the Department of Agriculture and Stock, Brisbane.



PLATE 8.—A BONNY LITTER JUST READY FOR WEANING.

A Prize-winning Litter at Sydney Show, exhibited by the owner, Mr. M. Marshall, Herdsman for Mr. Ralph Joyce, of Kyabram Victoria. These pigs were sired by the Champion Boar "Drayton's Chief," and were from that well-known prize-winning sow "Leona."

Pigs of this quality are not difficult to handle for they have become accustomed to other food in addition to the mother's milk before weaning. Note their even development, splendid quality, and rapid growth.



PLATE 9.—FIRST PRIZE MIDDLE YORKSHIRE SOW WITH LITTER, SYDNEY SHOW.

Ralph Joyce's "Kyabram Beauty" 2465. The litter is sired by "Coleraine" 2234, who won the Progeny Group Prize, Royal Show, Melbourne, 1922. This litter was line-bred. The sow only had the seven pigs, but made an exceptionally good job rearing them. The small black stain on the backs of the suckers was a result of the sow's milk being too hot for the piglets to suckle.



PLATE 10.—A THRIFTY, PROFITABLE LITTER.

Litter of Berkshire-Tamworth Pigs, fourteen in number, 8 weeks old, the property of Mr. George Stanfield, "Stanberry," Wondai. The sire was a pedigreed Berkshire boar, purchased at Wyrceema, and the dam a Gatton College Tamworth sow.



PLATE 11.--FINDING THE PEAS.

A group of young pigs at the Warren State Farm after weaning. These young pigs had the benefit of a roomy pasture, portion of which had been well littered over with cow pea hay. The pigs appear to be enjoying the search for the hidden peas.

THE HAMILTON COLD STORES.

The Minister for Agriculture (Hon. W. Forgan Smith) stated in the course of a recent Press interview that he had read the remarks of Mr. Wilkin, the President of the Queensland Butter and Cheese Manufacturers' Association, in his address delivered at the recent Factory Managers' Conference. He, Mr. Wilkin, referred to the Hamilton Cold Stores and mentioned the poor support given by the manufacturers of dairy produce to the Cold Stores. Mr. Wilkin stated he considered, too, that the site of the Cold Stores was not suitable, either for shipping or for the drawing of butter for local or interstate sales. It is recognised, said the Minister, that the adverse season has affected the production of dairy produce and, incidentally, this has reduced the amount normally available for cold storage. It can be definitely stated that the cold storage facilities at the Hamilton are equal, if not superior, to anything in the Southern Hemisphere, and the storage charges could not be reduced without causing a deficiency which would have to be made good by the general taxpayer. The site of the Cold Stores was selected after careful consideration of the whole of the circumstances, and if Brisbane continues to expand at the present rate it will not be long before the Cold Stores will be practically in the heart of the city. The site selected allows of special facilities in the matter of loading of produce from the Cold Stores into the ship's hold, which is quite a consideration in the hot summer weather. The oversea liners of all shipping companies trading to this port have, with one exception, berthed their vessels at the Cold Stores Wharf and many shipping masters have made complimentary reference to the splendid facilities that are provided there. While the conference was sitting a vessel called to pick up a small parcel of butter and this limited amount of cargo would not have enticed the vessel to berth specially at the wharf if the facilities were not complete and convenient. Mr. Wilkin made special reference to the interstate and local trade in butter. With the advent of methods for the organised marketing of dairy produce the Minister pointed out that it is possible that the interstate trade in butter may be reduced in volume, and the experience of this season goes to show a reduced tonnage called for by Southern States. Little or no butter required for local sales is cold stored, and consequently this class of trade is not affected to any material extent.

NOTE.—Black figures in above table indicate date of service.

This chart presents in an instructive form figures relating to the gestation period of brood sows. For example, a sow mated to the boar on 1st January is due to farrow on 22nd April; a sow mated on 1st July is due on 20th October. The chart should be preserved for future reference by breeders of all classes of pigs. The normal period of gestation, *i.e.*, the period from the time of conception to the birth of the young pigs, is 112 days, this period is sometimes remembered as roughly three months three weeks three days, or 16 weeks. With very young sows the period is sometimes of shorter duration, and instances are on record where young sows have farrowed at from 100 to 108 days after becoming pregnant; on the other hand, old sows in abnormal condition have been known to carry their young for more than 140 days.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

HONEY SORGHO.

N. A. R. POLLOCK, H.D.A., Northern Instructor in 'Agriculture.

A variety of sorghum that has given exceptionally fine results in several trials in the Northern Division of the State is that known as Honey Sorgho, seed of which was secured from the Bureau of Agriculture, Washington, U.S.A., some three years ago. The first trial in 1924 on O. T. M. Hansen's farm at Carbeen, on the Atherton Tableland, yielded at the rate of 25 tons 5 cwt. 2 qr. 12 lb. per acre.

The trials the following year on the same farm, sown at different periods, yielded at the rate of 31 tons 16 cwt. 1 qr. 20 lb. and 33 tons 15 cwt. 2 qr. 24 lb. respectively.

A further trial this year on Mr. C. Daybell's farm, at Proserpine, yielded at the rate of 34 tons 9 cwt. 1 qr. 24 lb. per acre, the growth being made between 15th January and 1st May.

The following interesting particulars are taken from Mr. Daybell's crop record:—The soil on the experimental plot is heavy alluvial scrub, over clay, on which sugar-cane had been previously grown. The land preparation covered one ploughing, three harrowings, and once over with a spring-tooth. The condition of the soil at the time of planting was rough and moist. "Stud" seed was used. Drills were 3 ft. apart, and the seed was spaced thinly at the rate of 4 lb. per acre. Germination was 100 per cent. In subsequent cultivation the plot was scarified three times. The rainfall record in the course of the period of growth was 2,209 points from January to May. The quality of the crop was excellent and true to type. It was cut for green feed mainly, but some was held back for seed.

This year at Charters Towers, on the farm of Mr. T. James, under irrigation from an overhead tank filled from a windmill-driven pump and without any irrigation, a growth of 7 ft. immature was obtained in eight weeks.

Honey Sorgho, as its name implies, is very sweet, and is greatly relished by stock of all kinds. Its generally high yield in the North indicates that it will eventually displace saccharine in popular favour.



PLATE 12.—HONEY SORGHO, EXPERIMENTAL PLOT, C. R. DAYBELL'S FARM, PROSERPINE.

Sown, 11th January, 1925 ; Estimated, 1st May, 1925 ; Seed just set but not hard ; Yield per acre, 34 tons 9 cwt. 1 qr. 24 lb.



PLATE 13.—HONEY SORGHO, HALF GROWN, O. T. M. HANSEN'S FARM, CARBEEN, ATHERTON TABLELAND.



PLATE 14.—HONEY SORGHO UNDER IRRIGATION AT T. JAMES'S FARM, CHARTERS TOWERS, MAY, 1926.

Height, 7 feet in 8 weeks' growth.



PLATE 15.—HONEY SORGHU, O. T. M. HANSEN'S
FARM, CARBEEN.

QUEENSLAND SHOW DATES, 1926.

The following is the official list of Queensland Show Dates for 1926, as issued by the Queensland Chamber of Agricultural Societies:—

Charters Towers: 14th and 15th July.
 Caboolture: 15th and 16th July.
 Ingham: 16th and 17th July.
 Mount Gravatt: 17th July.
 Maleny: 21st and 22nd July.
 Rosewood: 23rd and 24th July.
 Ayr: 23rd and 24th July.
 Ithaca: 24th July.
 Barcaldine: 27th and 28th July.
 Bowen: 28th and 29th July.
 Nambour: 28th and 29th July.
 Proserpine: 30th and 31st July.
 Pine Rivers: 30th and 31st July.
 Redcliffe: 4th and 5th August.
 Sunnybank: 7th August.
 Royal National: 9th to 14th August.
 Crow's Nest: 25th and 26th August.
 Coorparoo: 28th August.
 Wynnum: 3rd and 4th September.

Imbil: 8th and 9th September.
 Zillmere: 11th September.
 Gympie: 15th and 16th September.
 Beenleigh: 16th and 17th September.
 Stephens: 18th September.
 Pomona: 22nd and 23rd September.
 Malanda: 22nd and 23rd September.
 Esk (Camp Drafting): 24th and 25th September.
 Melbourne Royal: 16th to 25th September.
 Rocklea: 25th September.
 Nundah: 1st and 2nd October.
 Kenilworth: 7th October.
 Southport: 9th October.
 Enoggera: 9th October.
 Balmoral: 16th October.
 Brookfield: 23rd October.

HINTS ON BANANA CULTURE IN NORTH QUEENSLAND.

By WILLIAM ELLISON, junr., Packing Instructor.

Planting.

Selection of Locality.—Be particularly careful to see that the site selected is well protected from heavy wind.

Selection of Suckers.—Select suckers having good corms with a tapering stem with narrow leaves. Trim all roots and loose matter off the corms.

Holing.—Dig the holes about 18 inches deep by about 1 foot across.

Planting.—Set the corm on the bottom of the hole, and only put about 4 inches of soil over the top of the corm and chip in the sides of the hole with a mattock to supply the soil, thus leaving the plant set in a basin. Do not plant closer than 12 feet apart each way.



PLATE 16.—TYPICAL BUNCHES OF NORTHERN-GROWN
CAVENDISH BANANAS.

Chipping.—During spring and summer only surface chipping is to be done in order to keep down weed growth. Deep chipping, using a mattock by preference, should be done during winter from May to July inclusive. Where horse implements can be employed, do not use a mouldboard plough as it will only tear and bruise the roots, but use a disc plough that will cut the roots clean. This work must only be done from May to July. During the rest of the year do not use horse cultivation at all, but depend upon surface chipping.

Suckering.—If the corm when planted has had its surplus eyes removed, there is no necessity to desucker until the maiden bunch appears. Then two suckers, properly placed in relation to the maiden plant, are left, one of which should be about three or four months older than the other. When the bunch is cut from the maiden plant, allow the third sucker to take its place, this sucker to be some weeks younger than the previous younger sucker. If this is done the banana stool will eventually consist of three plants showing bunches, one bunch ready to cut, one half matured, and one ready to shoot, as well as three followers in the same order.

Suckering can be done at two periods of the year; first, from September to January, when a heavy suckering can be given, and secondly, in June, when a light suckering can take place. When suckering see that the suckers left to bear are directly off a bearing plant or one that has recently borne a bunch, not from a sucker that has not produced a bunch.

Suckering is best done by means of a draining spade, commonly known as a grafting tool, as this implement will disturb the plants that are left less than any other, and will cut the sucker to be removed clean away from the parent bulb.

Handling the Fruit.

Cutting.—Cut as far as possible in the early morning, not during the heat of the day. Handle the bunch very carefully, so as to prevent bruising, as a bruised fruit is a spoilt fruit. Do not carry the bunch on the shoulder, but use a yoke, and attach the bunches to it by the lower portion of the bunch, so that the stem end of the bunch will be downwards.

When cutting the bunches cut the plant right down to or as near the corm as possible in order to determine whether there are any beetle borers in the corm, and if beetle borers are present in the plantation, poison the cut surface of the corm with a mixture of Paris green and flour, one of the former to six of the latter, and cover the cut surface of the corm with a banana leaf. As soon as the corm rots out dig it out completely, using a draining spade for the purpose. By doing this a breeding ground for the beetles will be destroyed. This work should be carried out from September to January, and when the old corm has been removed place a quantity of fresh topsoil in the hole from which it has been taken.

Dehanding.—Dehand the bunches within three hours of cutting, and carry out this work preferably in the plantation, taking care that both bunches and hands when dehanding are well protected from the sun, otherwise the fruit will be badly blackened. If the bunches are dehanding in the plantation, cart the hands to the packing shed by means of a sled lined with bagging, so as to prevent the fruit being bruised. On arrival at the shed, rough grade the hands to size, taking care not to bruise any fruit, and place carefully on the benches. When all the fruit has been brought to the shed, go over the hands carefully and grade ready for packing, leaving the graded hands on the packing benches, where they should remain during summer for at least forty to forty-eight hours before they are packed, and during winter not less than twenty-four hours before placing them in the case. Keep all the fruit on the packing benches covered at night with a single thickness of corn sacking, which should be removed during the day, unless there is a strong dry wind blowing.

SOME UNDESCRIBED QUEENSLAND TREES.

In a recent paper published by the Royal Society of Queensland Mr. C. T. White, Government Botanist, and Mr. W. D. Francis, Assistant Botanist, in the course of their work of keeping the botanical records of the State up to date, described a number of plants which had previously escaped the notice of botanists and others. In this issue there appear illustrations of two of these previously undescribed plants. Plate 17 shows specimens of *Sideroxylon singuliflorum*, which is a small tree found recently by Mr. C. T. White near the summit of Bellenden-Ker, the highest mountain in the State. *Sideroxylon*, the genus to which the newly described tree belongs, is represented in the Queensland flora by thirteen species, the most common of which is, perhaps, the Black Plum or Black Apple *Sideroxylon australe*. In Plate 18 specimens of *Polyosma rhytophloia* are shown. This species is a small tree of the Eungella Range, westward of Mackay. Flowering specimens of it were collected by Mr. W. D. Francis in 1922, and from them the species was named and described.



PLATE 17.—*Sideroxylon singuliflorum* (new species). 1, about one-half natural size; 2, calyx lobes; 3, anther; 4, bud; 5, flower, with calyx and corolla removed.



PLATE 18.—*Polyosma rhytophloia* (new species). 1, fruit-bearing twig about one-half natural size; 2, flower bud $\times 4$; 3, flower $\times 4$; 4, flower with petals and stamens removed; 5, stamens $\times 4$; 6, seed $\times 4$.

SUNDRY NOTES ON INJURIOUS INSECTS OF THE STANTHORPE DISTRICT.

BY HUBERT JARVIS.

Army Worms.

The larvæ of certain species of Noctuid moths have this season caused a good deal of destruction to young tomato plants, cabbages, &c. Unfortunately, these caterpillars have not confined themselves to "truck crops." One of them, *Cirphis unipuncta*, has been found attacking peaches and plums on the trees. This is, as far as I am aware, the first record of this species attacking fruit; the damage in one orchard was fairly extensive, and the fruit of several peach trees was entirely ruined by these insects. The caterpillars in this case ate their way right into the fruit, generally setting up a destructive rot, and rendering the fruit unfit for human consumption. The mode of attack is well illustrated in the accompanying photograph.

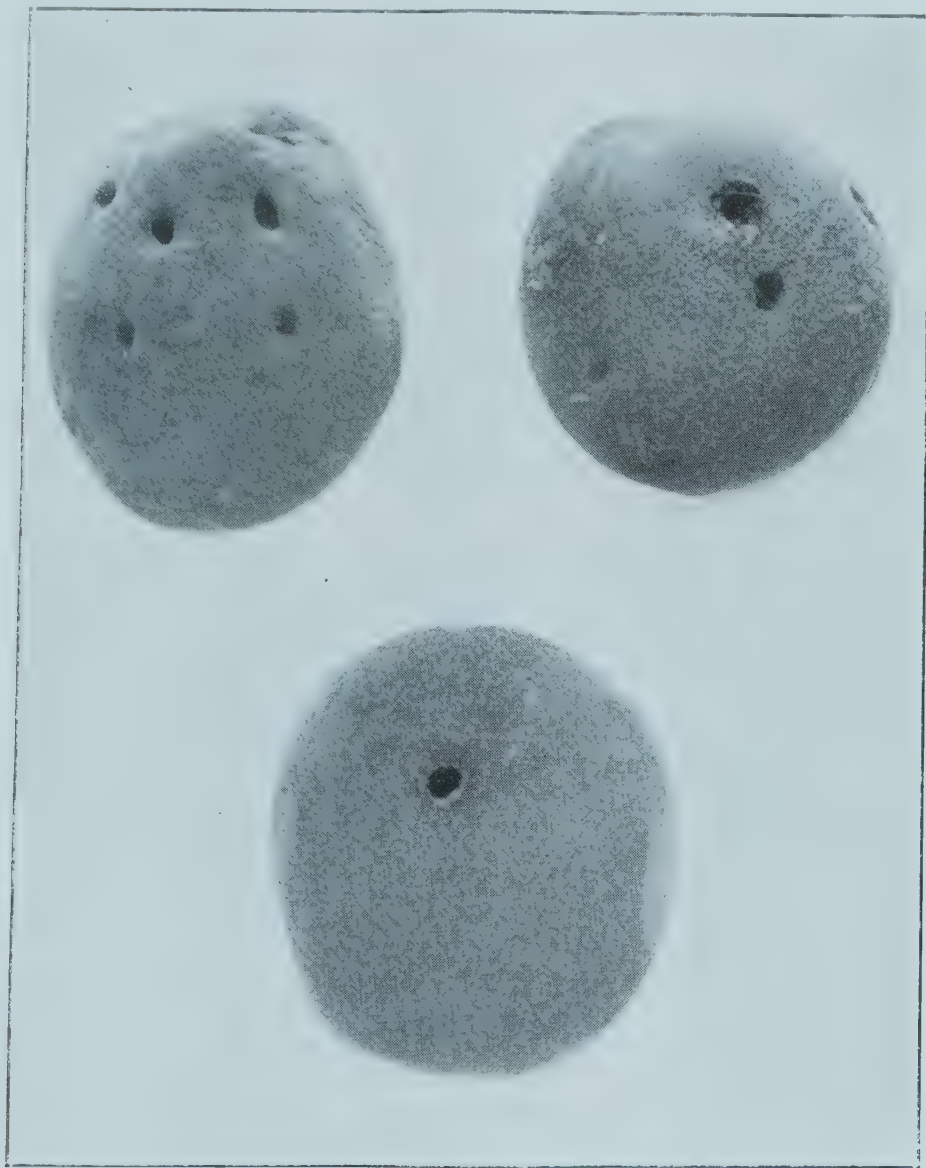


PLATE 19.—PEACHES ATTACKED BY THE CATERPILLARS OF *Cirphis unipuncta*.

I have found this caterpillar attacking almost all kinds of garden plants in addition to crops. The caterpillar is just over an inch long, varying in colour from greenish to brown, and having white longitudinal stripes down its sides and back. The moth measures about $1\frac{1}{2}$ inches across the expanded wings, and is, on the upper wing, of a uniform fawn colour; the lower wings are lighter in colour, and clouded with dark brownish-black along the lower margin of the wings.

The most effective spray I have found in combating this pest is the following:—

Paris green	..	..	..	..	3 oz.
Black leaf (40 per cent.)	..	..	..	..	2 $\frac{1}{4}$ oz.
Sunlight or soft soap	..	..	..	..	12 oz.
Water	..	..	..	..	9-10 gallons

This spray has proved very effective indeed in controlling not only army worms but also cabbage moth (*Plutella cruciferarum*) and pumpkin beetle.

Inspector J. Munro has used the following army worm poison with great success, and has, in fact, obtained, in regard to tomatoes, when planting, an 80 per cent. control of the pest:—

Bran or pollard	..	..	..	..	..	1 quart
Paris green or arsenate of lead	..	..	..	..	..	2-3 oz.

Thoroughly mix the arsenical with the bran, dry; when mixed, dust a little around each plant after planting.

Two other Noctuid caterpillars have been notably prevalent in this district this season—viz., (*Heliothis obsoleta*) and a species of *Agrotis* not yet determined—the former attacking cabbages and young tomato plants, and the latter the fruit of the tomato.

Inspector H. St. J. Pratt reports army worm damage in the Broadwater district, and army worms were also, in fact, present in every district in the Granite Belt.

Pumpkin Beetle.

This destructive insect has been present this season in great numbers in the district, and has done considerable damage to egg plants (*vide* Inspector Pratt's report), pumpkins (all varieties), vegetable marrow, watermelons, rockmelons, cucumber, and, in fact, all cucurbitaceous plants. The spray mentioned in relation to army worm has been found helpful in controlling pumpkin beetle.

Chrysolophus spectabilis (Diamond Beetle).

This large and handsome weevil has this season been reported damaging the young wood of grape vines in the Spring Creek district. Specimens of the insect and its damage were submitted to this office by Mr. T. Costin, of Spring Creek.

The damage to the vines is due to the insect encircling the young wood, which thus weakened easily breaks off. I have not known this beetle to attack any economic plant before, and I do not consider that it will become a pest of any importance.

An Anthomyid Bean Pest.

On 10th December Inspector Pratt brought to my notice an insect injuriously related to French beans. The damage is caused by the maggot of a small Anthomyid fly which attacks young bean plants below the ground, boring into and finally completely eating out the succulent root, thereby causing the death of the plant.

Mr. Pratt supplied abundant material, which enabled us to breed out the fly, and obtain a good series of the maggots and puparia. In 1924 I secured the maggots of this fly similarly damaging French beans at Applethorpe, but I was then unsuccessful in breeding the fly.

The fly is about the size of a small house fly, and not unlike it in colour, but is of a more slender build. The thorax is grey, with four longitudinal rows of black dots, and from each of these dots springs a long black bristle. On the scutellum, which is similarly coloured to the thorax, are four additional dots, two at the apex and one on each side; these dots also each support a long black bristle. The abdomen is uniformly dark grey, pubescent, and clothed with fine bristles; the legs are long and black, and well clothed with hairs.

The puparium is about 5-6 mm. in length, and reddish-brown in colour, not unlike the puparium of *Lonchaea splendida* (the Green Tomato Fly). The maggots, which attain a length of just under half an inch, pupate in the soil just beneath the bean plant. The period of the life cycle of the fly has not yet been ascertained.

It is difficult to suggest, at present, any satisfactory control measure in dealing with this pest, which is somewhat similar to the notorious Bean Fly (*Agromyza phaseoli*) in regard to the destructive effect which it produces. It does not, however, like the latter fly, lay its eggs on the under surface of the leaf. Probably in the case of the Anthomyid fly the egg is deposited just below the surface of the soil, close to the young bean plant.

Tenebrionid Larva (*Pterohelaus piceus*).

The larva of a Tenebrionid beetle (*Pterohelaus piceus*) was found by Inspector Pratt to be attacking young tomato plants in the Broadwater district. The damage caused by this insect was not extensive, and it is, in fact, rather unusual for it to attack a healthy plant. I have bred it from rotting prickly-pear. It is probable that the dry condition of the soil at the time, and the absence of any humus in the soil, such as the decaying roots of weeds, &c., was responsible for this beetle larva attacking the living roots of tomato plants. I do not consider that it will prove to be a pest of any importance.

MEASUREMENT OF STANDING TIMBER.

Selectors and others frequently want to find out the quantity of timber in a standing tree. The method described here will give the contents of timber in a tree approximately, and does not take into account accurately the whole of the limbs. Cut a piece of pine or deal board into a right-angled triangle at (B). Let the observer place the long edge of board to his eye, and move backward or forward (on level ground) until the edge of board exactly coincides with top of tree, taking care that the plumb line is along edge AB, and hangs steady. Now measure from eye to butt of the tree (say, 100 ft.). This distance, plus the height of eye from the ground, is the height of the tree. (See example in illustration.) ES plus EO equals TK. ES equals 100 ft.; SK or EO equals 5 ft.; therefore height of tree is 105 ft. To find the cubic contents of tree, multiply the square of half the diameter of tree by 3.14, and multiply this product by half the height of tree:—Diameter of tree is 4 ft.; square of half diameter equals 4 by 3.14 by 52.5 equals 659.4 cubic ft.



Another simple method of ascertaining the height of a tree can be used on a sunny day.

Cut a stick about 12 in. long. Place it upright in the ground. Note the height of the stick above the surface and measure the length of the shadow thrown by it. Then measure the shadow of the tree. Suppose this to be 20 ft., and the shadow of the stick to be 6 in. The question then is:—If a stick 12 in. high throws a shadow 6 in. long, how tall is a tree which throws a shadow 20 ft. long (240 in.)? By simple proportion—

$$6 : 240 :: 12 : 480, \text{ or } 40 \text{ ft.}$$

This example obviously requires no calculation, as both stick and tree throw a shadow equal to half their height.

ANOMALIES IN EGG PRODUCTION.

By P. RUMBALL, Poultry Instructor.

Eggs are frequently laid in anything but a perfect condition, many forms exciting much wonder, but if the manner in which the egg was formed is borne in mind reasonable conclusions for abnormalities can be advanced.

Reproductive Organs.

The reproductive organs of the hen consist of an ovary and oviduct. The ovary is usually situated on the left of the body near the kidney. The illustration conveys a very good impression of its appearance during the stages of production. The oviduct commences near the ovary, and after making several bends in its course terminates at the entrance to the cloaca. It is connected to the spinal column by a thin membrane. Both the ovary and oviduct are very vascular during the laying period, but shrink considerably in size when the bird is not producing. The enlargement of the ovum 2 and 3 is due to the collection of egg yolk. This causes the yolk sack to become distended and become very thin upon its non-vascular area 4 (stigma), where it eventually ruptures and releases the yolk into the opening of the oviduct. The empty sack collapses and is eventually reabsorbed.

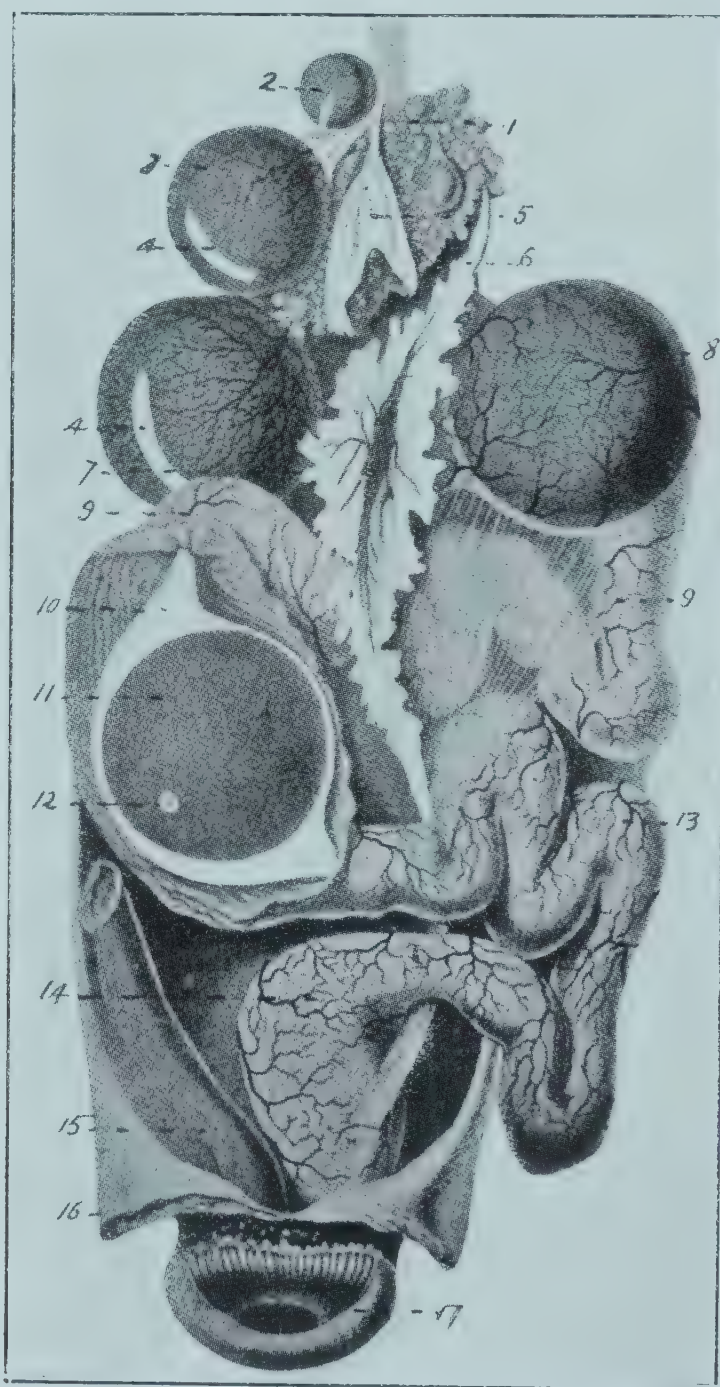


PLATE 20 (Fig 1).

The yolk when it enters the oviduct induces the secretion of albumen. A dense layer is placed on the yolk in the upper portion. In its course down the oviduct several layers of thinner albumen are secreted, and finally two layers of very dense albumen form the membranes and ultimately become the lining of the shell. The egg then enters the uterus or shell-forming portion of the oviduct. Here a thick white calcareous fluid is deposited upon the membrane which condenses and becomes the shell. The time it takes for an egg to do this naturally varies. Some authorities give it as eighteen to twenty hours. It will, however, be understood that the process of forming the shell would take several hours, and that the egg would be retained in the uterus during this process, therefore frights to laying birds should always be avoided.

FIG 1.

This shows the reproduction organs of the hen. Two ova are shown in different parts of the oviduct. Under normal conditions one only is present.

1. The Ovary. Young follicles (ovules), white, and various shades of yellow to reddish orange.
- 2 and 3. Larger follicles (ovules), reddish egg-yolk colour and highly vascular.
4. Stigmata. A non-vascular area along which rupture of the follicle takes place when the ovum is ripe.
5. An empty follicle from which a ripe ovum has been shed. These are generally yellow in appearance.
6. Cephalic lip of ostium.
7. Funnel of oviduct (ostium tubæ abdominale).
8. Ovum in the upper part of the oviduct.
9. Region of oviduct where the egg white (albumen) is secreted.
10. Egg white (albumen) surrounding the ovum or yolk.
11. The ovum (or yolk).
12. Germinal disc (blastoderm, including the germinal vesicle).
13. Region of the oviduct in which the superficial layers of egg white (or albumen) and the shell membranes are secreted.
14. Lower portion of oviduct—the uterus, in which are the glands which secrete the calcareous matter which forms the shell. Here also are the pigment-secreting cells which add colour to the shell of the eggs of some breeds of fowls.
15. Rectum (lower portion of bowel).
16. Wall of abdomen reflected.
17. Anus (or vent), external opening of cloaca, the pouch into which both bowel and oviduct discharge.

An Egg Within an Egg.

A Black Orpington hen owned by Mr. P. Boughey, Perse street, Grange Estate, must have established a record in the laying of abnormal eggs.

She commenced by laying an egg weighing 6.75 ounces, and at intervals of about seven days repeated the act with eggs of slightly less weight, laying in all five eggs. In each instance there was an egg within an egg. The accompanying plate (fig. 2) shows the outside shell and the smaller or normal egg which was within.

This anomaly is not infrequent. It can be accounted for by the irregular contraction of the uterus (shell-forming portion of the oviduct) forcing the egg upwards for a certain distance where it met another egg in the course of manufacture. These two eggs were then returned to the uterus and enclosed in the one shell.

Blood Clots in Egg.

The presence of blood clots in eggs is due to hemorrhage. This may take place on the ovary or oviduct. In the former case the clot will be found upon the surface of the yolk, while, if hemorrhage has taken place in the oviduct, the clot will be found in the albumen. Hemorrhage is the result of congestion due to the great functional activity of the reproductive organs, and when the trouble is prevalent it should indicate to the breeder that the birds are being fed on ration which is too stimulating. This state of affairs is best rectified by the liberal feeding of green feed and a reduction in the amount of the animal content of the ration.

Soft-Shelled Eggs.

The production of soft shelled eggs may be due to either the lack of shell-forming material in the ration, to the inflammation of the shell-forming glands, fright, and over fat stock. Eggs without shells are more difficult to lay and are therefore retained for a longer period in the uterus. This retention is the cause of irritation or inflammatory condition, and occasionally causes prolapsus or eversion



PLATE 21 (Fig. 2).

of the oviduct. Breeders should take careful note of any bird laying soft-shelled eggs. To treat fowls in these cases the cause needs to be located. If due to the lack of mineral matter, give crushed oyster shell, bone meal, broken mortar, and plenty green feed. If inflammation is the cause, feed a less stimulating ration, and in the case of fat stock, reduce their condition by making them work for their living by feeding all grains in litter.

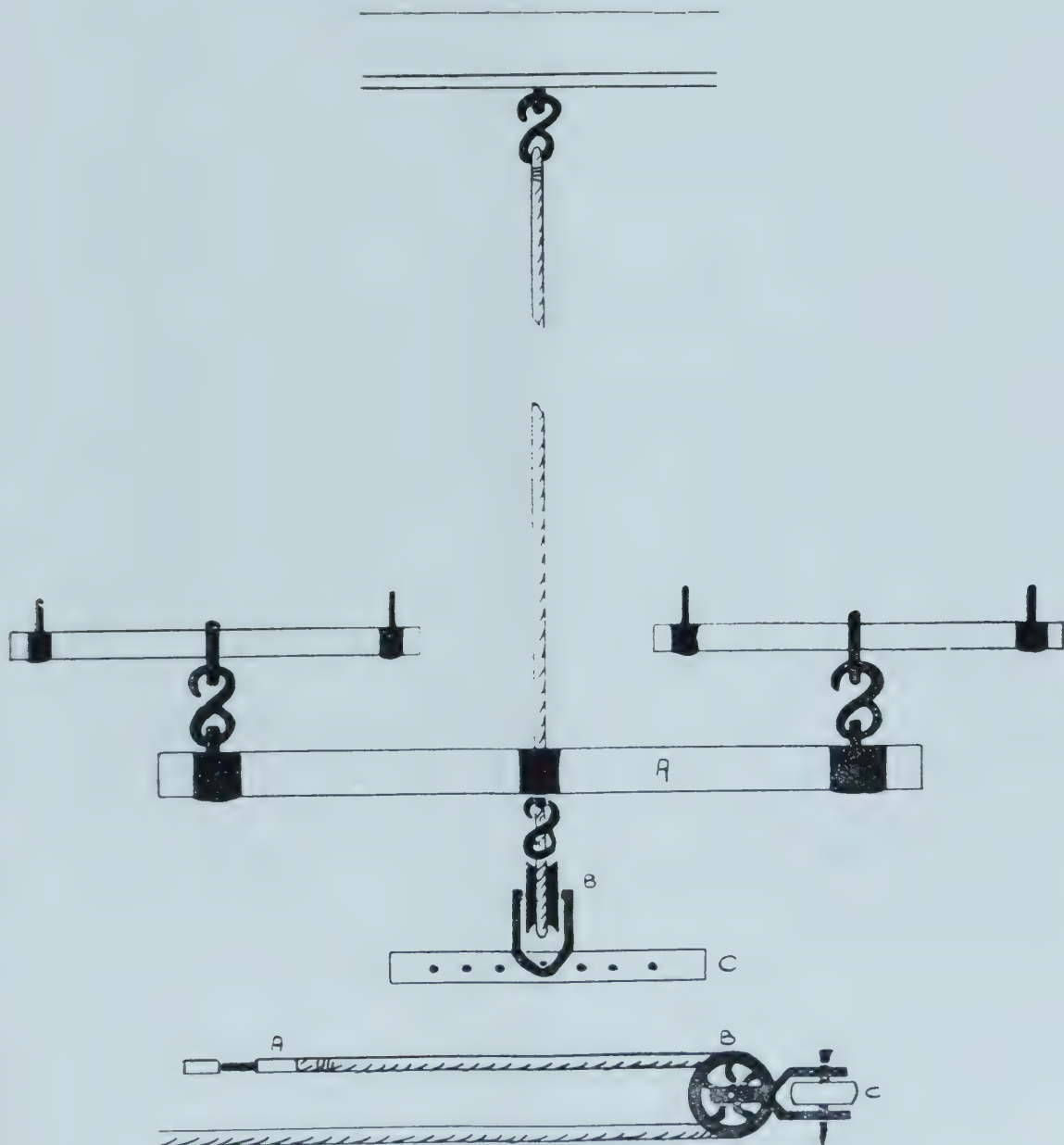
Double-Yolk Eggs.

Eggs with two and sometimes three yolks are formed. This is the result of two yolks being released from the ovary in close proximity. These yolks descend the oviduct so near together that they are encased in the one shell. They are generally larger than single yolk eggs and consequently are liable to cause injury to the oviduct.

Incomplete Eggs.

Eggs a quarter or less of the normal sized egg containing no yolk are not uncommon. The causes vary. Irritation of the central portion of the oviduct is advanced as a cause by one authority. It is a common occurrence for poultry keepers to collect this class of egg at the latter end of the laying season. It is then possibly due to hens that are just terminating their lay.

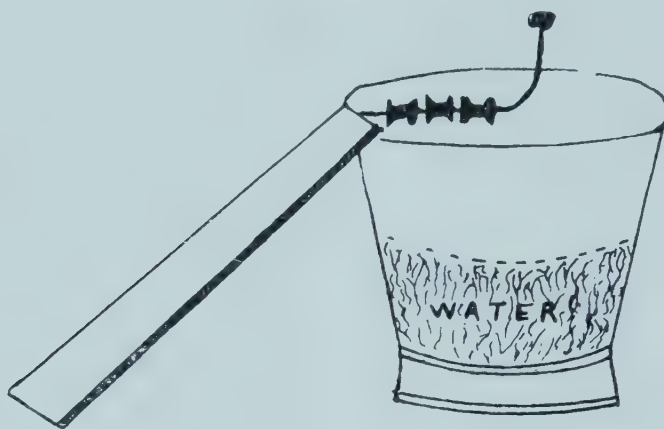
A rather interesting case came under the notice of the writer quite recently. A hen in public competition laid 100 or more normal eggs during the first six months of the test. She then commenced to lay these small yolkless eggs, and within six months had produced about 100 of them. With the owner's sanction the bird was destroyed and opened for examination. The ovary was in perfect order, and producing yolks at a normal rate. These eggs were released in the abdominal cavity, owing to a derangement of the upper portion of the oviduct, and reabsorbed by the system. There were quite a number of what had once been egg yolks loose in the body, and in the uterus a small yolkless egg.



A TANDEM HITCH FOR TEAMS.

A NOVEL MOUSE TRAP.

The illustration is self explanatory. All that is required is a small board into one end of which is fixed a short length of No. 8 wire shaped as shown. Three cotton reels are then strung on the wire, the free end of which is baited with a piece of cooked bacon or toasted cheese. Tallies as high as 150 mice in a single night have been obtained by this simple device.



General Notes.

State Insurance—Continued Success.

As the time for the annual declaration of the bonuses payable in the Life Department on participating policies for the year ended 31st December last is drawing near, the remarks of the Premier and Treasurer (Hon. W. McCormack), in the course of a Press statement, are interesting. He stated that the Insurance Commissioner had received preliminary advice from the Actuary (Mr. T. W. Bremner, F.F.A., A.I.A.) that, after providing all necessary reserves for liabilities under policies, there was a surplus sufficient to provide a reversionary bonus 20 per cent. greater than in previous years. Bonus certificates, the Premier added, were in course of preparation, showing a reversionary bonus for 1925 of £1 16s. per £100 sum assured (as against £1 10s. for 1924) on participating whole life policies and £1 4s. per £100 (as against £1 for 1924) on endowment insurance and endowment policies. The Premier added that the increased bonus was more than satisfactory.

Staff Changes and Appointments.

Mr. St. John Robinson has been appointed an officer under "*The Animals and Birds Acts, 1921 to 1924.*"

The resignation of Mr. A. F. Robertson as Assistant to Cane Tester at the Proserpine Mill for the forthcoming sugar season has been accepted.

Messrs. C. H. Jorgensen and W. J. Richardson have been appointed Cane Testers for the 1926 sugar season at the Farleigh and Isis Central mills respectively, and Messrs. T. P. Brown and G. O. Doherty have been appointed Assistants to Cane Testers at the Farleigh and Moreton Central mills respectively.

The Naming of Woods—Corrigenda.

Corrigenda to "The Naming of Woods," by E. H. F. Swain, Chairman Provisional Forestry Board, published in the "Queensland Agricultural Journal" on the 1st May, 1926:—

Page 435—Below *Albizzia toona*—Red *Siris*, insert—

<i>Albizzia</i> spp.	..	..	Yellow Bean (Atherton)	..	Yellow <i>Siris</i>
<i>Albizzia procera</i>	..	..	White <i>Siris</i> (India)	..	Brown <i>Siris</i>

Page 437—*Eugenia hemimampra*—delete *hemimampra* and insert *hemilampra*.

Page 439—*Casuarina Luchmanni*—delete *Luchmanni* and insert *Luehmanni*; in last line, delete Threaded and insert Flame.

Page 440—Delete—

<i>Hemicyclia australasica</i>		| Grey Birch (Imbil)	..	| Grey Marara
<i>Vitex lignum vitæ</i>	—delete <i>Satin</i> and insert <i>Yellow</i> , to read <i>Yellow Hollywood</i> .			

Below *Pittosporum rhombifolium*, insert—

Siphonodon australe	..	Ivorywood (Imbil)	..	..	Ivory Hollywood
		Wild Guava, Floorwood			
Scolopia Brownii	..	..	..	..	Pink Hollywood
Lucuma sericea	..	Silky Hornbeam	..	..	Brown Pearwood
Chrysophyllum pruniferum		..			Pink Pearwood

Bottom of page, delete—

<i>Siphonodon australe</i>	..	| Ivorywood (Imbil)	..	..	| Ivorywood
		| Wild Guava			
		| Floor Wood			
<i>Scolopia Brownii</i>	..	..	..		| Pink Pearwood

In Box group, insert—

<i>Strychnos arborea</i>	..	..	Needle and Thread Wood	| Threaded Box
			Sago Wood	

Page 441—Delete—

Strychnos arborea	..	Needle and Thread Wood	Threaded Boxwood
		Sago Wood	
Lucuma sericea	.. ..	Silky Hornbeam	Brown Boxwood
Chrysophyllum pruniferum		..	Pink Boxwood

Insert after *Sideroxylon Pohlmanianum*—

<i>Sideroxylon myrsinioides</i>	..	|	..	| Yellow Boxwood
and delete same seven lines below.				

Page 441—After *Sideroxylon Pohlmanianum*, insert—

<i>Hemicyclia australasica</i>	..	Grey Birch (Imbil)	..	Grey Boxwood
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The Coming Royal National Show.

Great preparations are being made by the Council of the Royal National Agricultural and Industrial Association for their fifty-first show scheduled for 9th to 14th August next. With an ever increasing schedule the show programme necessitates an extension into the night, and ever onward the association is planning for night like day, and with a brilliantly illuminated ring will stage at least two great night show carnivals with ring programmes that will hold interest for every country visitor and the thrills of bushland for every city resident. Such a scheme of electric lighting is being planned as will make the carrying out of the ordinary day programmes easily possible.

Great ground improvements have been effected. Wholesale extensions have been made in the poultry, sheep, and pig sections. The accommodation for horses is provided for in a new and commodious building on the Gregory terrace-Brookes street corner. Adjacent to these stalls are the beef and fat cattle sections which have been remodelled on the best lines. The whole plan spells convenience for exhibitor and spectator, buyer and seller alike.

Schedules are ready, and will be sent post free to every applicant.

The Royal National Association has broken records all along the line, and anticipates, with its 1926 show, which marks its advent into the second half century of its progressive endeavour in the interests of agriculture and industrial development, to stage what will be, by reason of its many distinctive features, the finest show in the Commonwealth.

A Notable Visitor.

Among the visitors to this office in the course of the month was Mr. H. L. Russell, of the University of Wisconsin (U.S.A.) and Dean of the College of Agriculture and Director of the Agricultural Experiment Station in that State. Mr. Russell, whose mission to Queensland is connected with a scheme for a world-wide study of agricultural practice and problems, found much to interest him, and the geniality of our climate impressed him immensely.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1926 AND 1925, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	May.	No. of Years' Records.	May, 1926.	May, 1925.		May.	No. of Years' Records.	May, 1926.	May, 1925.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton ...	2.04	25	0.22	0.15	Nambour ...	4.99	30	5.89	6.30
Cairns ...	4.55	44	1.43	0.10	Nanango ...	1.58	44	0.34	1.71
Cardwell ...	3.74	52	0.29	0	Rockhampton ...	1.50	39	1.42	0.89
Cooktown ...	3.02	50	0.73	0.09	Woodford ...	2.99	39	1.65	4.10
Herberton ...	1.69	39	0	0.03	<i>Darling Downs.</i>				
Ingham ...	3.51	34	0.24	0.25					
Innisfail ...	12.59	45	1.08	2.77	Dalby ...	1.34	56	1.18	2.54
Mossman ...	3.97	13	0.11	0.04	Emu Vale ...	1.19	30	0.65	2.31
Townsville ...	1.35	55	0	0	Jimbour ...	1.24	38	0.88	3.73
<i>Central Coast.</i>					Miles ...	1.47	41	3.61	1.81
Ayr ...	1.16	39	0	0	Stanthorpe ...	1.93	53	0.85	2.86
Bowen ...	1.33	55	0.08	0	Toowoomba ...	2.22	54	1.41	1.89
Charters Towers ...	0.80	44	0.18	0	Warwick ...	1.58	61	1.01	1.92
Mackay ...	3.86	55	0.57	0.44	<i>Maranoa.</i>				
Proserpine ...	4.83	23	0	0.89					
St. Lawrence ...	1.83	55	0.38	0.81	Roma ...	1.42	52	4.59	1.32
<i>South Coast.</i>					<i>State Farms, &c.</i>				
Biggenden ...	1.73	27	1.20	0.93					
Bundaberg ...	2.59	43	9.95	0.59	Bungeworgorai ...	0.59	12	4.45	1.04
Brisbane ...	2.85	75	1.27	5.94	Gatton College ...	1.70	27	0.44	1.55
Childers ...	2.18	31	4.58	0.91	Gindie ...	0.99	27	0	0.37
Crohamhurst ...	5.14	30	5.37	7.61	Hermitage ...	1.26	20	0.86	2.17
Esk ...	2.06	39	0.80	3.12	Kairi ...	1.99	12	0.03	0
Gayndah ...	1.53	55	3.93	0.89	Sugar Experiment Station, Mackay	3.44	29	0.53	0.86
Gympie ...	2.97	56	2.57	3.00	Warren ...	0.95	12	1.12	0.22
Caboolture ...	2.92	39	3.05	4.39					
Kilkivan ...	1.91	47	1.29	2.97					
Maryborough ...	3.06	54	9.64	1.18					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year, and for the same period of 1925, having been compiled from telegraphic reports, are subject to revision.

FEEDING PIGS.

WHY WE SHOULD STUDY FEEDING PROBLEMS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

To correctly understand this important aspect of pig raising, it is necessary first that we should get right down to bedrock, as it were, and to begin at the beginning by studying the objects aimed at in feeding stock. All life requires food (and also warmth and moisture) and water, whether it be the minutest form of germ or animal life, or whether it be the fully developed male or female plant or animal; indeed, this is not only true of the physical, but of every other part of our bodies, and though in stock raising we aim mainly at developing the body, we also aim at the reproduction of bodies equally as well prepared as are the parents for the battle of life. We understand, therefore, that the animal body requires food to supply the material necessary for its growth. The animal stomach might, for purpose of comparison, be likened to a locomotive boiler and engine, in which both water and fire operate towards the production of the steam and power which represent the driving force. As the steam is required in considerable quantities constantly, it is necessary to continually stoke the fire, to keep the ashes and cinders well raked out and a sufficient draught of air passing under and through the fire, and to keep up the water supply in order that pressure may be retained, or as it is commonly referred to, "that there may be a sufficient 'head' of steam to do the necessary work." Thus there is not only a constant pressure or production of steam in building up, but there is also a constant waste going on in the utilisation of both the fuel and water, and these losses need to be made good by the addition of fresh supplies which must be at hand all the time. The animal body is constantly being built up as a result of the strength generated from the food, as it is absorbed in the form of "digestible nutrients" from the food stream as it passes through the stomach and bowels, and there is also a constant breaking down of tissue or waste as it has been referred to above; so it is equally necessary that fresh supplies of nutritious, succulent, and appetising food be at hand to feed the body as occasion requires.

In stock feeding, certain specific objects must be kept in view, and we must thoroughly understand each of these objectives in order to gain the maximum benefit from a study of our feeding problems.

The Objects of Feeding.

Technically speaking, the objects of feeding are—

- (1) To maintain bodily heat and strength.
- (2) To repair waste of tissue (muscle, flesh, fat, bone, sinew, blood, &c.).
- (3) To prepare for the reproduction of young.
- (4) To form new tissues and organs.
- (5) To enable the animal to perform muscular labour, or to fatten in preparation for slaughter for the purpose of converting the carcase into bacon, &c.
- (6) To allow of the secretion of various products, such as milk, blood, digestive juices, &c.
- (7) To allow of a reserve of stores being laid by in the form of fat, &c.

To Maintain Bodily Heat and Strength.—In a normal state the bodily temperature of various animals differs somewhat, though all reach the century mark. The normal temperatures of domestic stock are as follows:—

Horse	..	..	..	100	to	101	degrees Fahr.
Cow	..	..	..	101	to	102	" "
Dog	..	..	..	101	to	102	" "
Pig	..	..	..	102.6	to	103	" "
Sheep	..	..	..	103	to	104	" "
Fowl	..	..	..	105	to	107	" "

The cat has about the same temperature as the horse. The temperature of the healthy animal body does not fluctuate, however, to more than a very slight extent. The heat required to maintain temperature is provided from the food. Thus it is important that the food supply should be of sufficiently good quality and quantity at all times.

To Repair Waste of Tissue, &c.—As with the locomotive, so with the body there is a constant wear and tear. Bodily activity involves the destruction of the various elements of which the body is composed. No sooner is this destroyed than it needs replacing, hence the food supply must not only be sufficient and of good quality, but it must be given at regular periods and in sufficient bulk to enable the digestive organs to handle it to advantage, for some bulk is necessary, though the pig does not require the same bulky food as does the cow and the horse.

It matters not whether an animal such as the horse is at regular and at hard work or is at rest, there is still a waste of tissue going on; it cannot stop, and when there is a greater supply of fuel than is actually needed at the moment the energy is produced, the balance is stored in the form of fat for future use.

Even where an animal is at rest a certain amount of energy is needed for the performance of the internal work of the body. The heart is constantly beating, the acts of inspiration and respiration keep the lungs in regular movement; these, in company with the labour involved by the action of the stomach and intestines in the process of digestion, are a constant drain on the energy thus stored. All this energy thus required and stored comes from the food.

To Prepare for the Reproduction of Young, &c.—It stands to reason that a brood sow carrying a litter of, say, a dozen young pigs, must require more food than a sow not in pig, for not only must the sow's own body be kept going, but the development of the young pigs in her breeding sac must be kept provided for; these absorb large quantities of nutrients as they develop and mature.

Nature will even provide for their maintenance at the expense of the sow's own body if the food supply of the sow is insufficient or of poor quality. Breeding sows require abundant supplies of succulent green foods in preference to more limited supplies of concentrated food, such as maize, wheat, or barley, &c.

To Form New Tissues and Organs and to Enable the Animal to Perform Muscular Labour, &c.—It is not difficult to understand why the horse requires food when he is regularly occupied in farm or team work, or to understand why it is that an in-pig sow should have additional food, but many farmers find it difficult to realise that when the pig is fattening or even when he is growing it is performing something of the same muscular labour (though certainly the strain is not so severe) as is being performed by the horse. Here it is then that we see again the urgency of providing for an abundant supply of succulent, nutritious food of an appetising nature and sufficiently laxative in its action to keep the bowels working freely.

To Provide for the Secretion of Various Products.—The brood sow once relieved, internally, of her young pigs at birth, then takes on their feeding by way of the teat, and as young pigs usually have very vigorous appetites, the sow requires suitable milk-producing foods in liberal quantities in order to be able to secrete sufficient milk to maintain her growing litter. The milch cow, the brood mare, the lambing ewe, &c., all require similar study, nor are these the only ones, for the young pigs require careful tending even when they have reached a stage when they can be removed from the care of the sow and be weaned.

The young pigs and the pigs that are fattening in preparation for sale to the butchers and bacon curers are secreting and laying up stores both of flesh and fat. The horse stores his energy in the form of strong muscular tissue, capable of standing a heavy strain during the day's work. Animals fatten readily on good food, and the fat animal can be maintained for a long period on a much reduced ration of food.

Nor do we need to understand the objects of feeding alone; it is equally important that we understand the composition of the various constituents of the ration the pig consumes. We must also understand something of the composition of the tissues that need rebuilding.

The breaking down and the building-up processes going on in the body are frequently referred to under the term metabolism, to which further reference will be made in future articles.

Farm and Garden Notes for August.

Land which has been lying fallow in readiness for early spring sowing should now be receiving its final cultivation prior to seeding operations. Potato-planting will be in full swing this month, and in connection with this crop the prevention of fungoid diseases calls for special attention. Seed potatoes, if possible, should be selected from localities which are free from disease; they should be well sprouted, and, if possible, should not exceed 2 oz. in weight. Seed potatoes of this size are more economical to use than those large enough to necessitate cutting. If, however, none but large-sized seed are procurable, the tubers should be cut so that at least two well-developed eyes are left. The cut surfaces require to be well dusted with slacked lime, or wood ashes, as soon as possible after cutting. Where it is necessary to take action to prevent possible infection by fungoid disease, the dipping of potatoes in a solution of 1 pint of 40 per cent. formalin to 15 gallons of water, and immersing for one hour, will be found effective. Bags intended for the subsequent conveyance of tubers to the paddock should also be treated and thoroughly dried. After dipping, spread out the potatoes and thoroughly dry them before re-bagging. Where the tubers are cut, the dipping is, of course, carried out prior to cutting.

Arrowroot, yams, ginger, and sugar-cane may be planted this month in localities where all danger from frosts is over.

Maize may be sown as a catch crop, providing, of course, that sufficient soil moisture is available.

Sweet-potato cuttings may also be planted out towards the end of the month.

Weeds will now begin to assert themselves with the advent of warmer weather; consequently cultivators and harrows should be kept going to keep down weed growths in growing crops and on land lying fallow, as well as on that in course of preparation for such crops as sorghums, millets, or panicums, maize, and summer-growing crops generally.

Tobacco seed may be sown on previously burnt and well prepared seed-beds.

KITCHEN GARDEN.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnips, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohlrabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

FLOWER GARDEN.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragons), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberose, amaryllis, paneratum, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm, moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2.63 in., and for September 2.07 in., increasing gradually to a rainfall of 7.69 in., in February.

Orchard Notes for August.

THE COASTAL DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of citrus fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with lime and sulphur wash.

Where citrus trees are showing signs of failing, such as large quantities of dead or badly diseased wood in the head of the tree, they can (provided the root system is healthy) be renovated by cutting back the entire top of the tree till nothing but sound healthy wood is left. This should be thinned out, only sufficient main limbs being left from which to form a well-balanced tree, and the trunk and limbs so left should receive a dressing of lime sulphur, or Bordeaux paste.

Healthy trees that are only producing inferior fruit should be treated in a similar manner, and be either grafted with an approved variety direct or be allowed to throw out new growth, which can be budded in due course. The latter method is to be preferred, and an inferior and unprofitable tree can thus be converted in the course of a couple of years into a profitable tree, producing good fruit.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the tree's use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Do not be afraid if you cut a number of surface roots when ploughing the orchard, but see that you do cut them, not tear them. Use a disc plough and keep the discs sharp, and the root-pruning the trees will thus receive will do more good than harm, as it will tend to get rid of purely surface roots.

Planting of all kinds of fruit trees can be continued, though the earlier in the month it is completed the better, as it is somewhat late in the season for this work. The preparation of land intended to be planted with pineapples or bananas should be attended to, and I can only reiterate the advice given on many occasions—viz., to spare no expense in preparing the land properly for these crops—as the returns that will be obtained when they come into bearing will handsomely repay the extra initial expense. Growers of pineapples and bananas who send their fruit to the Southern markets should take more care in the grading and packing of such fruit, as their neglect to place it on the market properly means a big difference in price, and entails a loss that could be avoided had the necessary care and attention been given. The same remarks apply to the marketing of citrus fruits, papaws, custard apples, strawberries, cucumbers, and tomatoes, all of which are in season during the month.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You want only one strong shoot from your cutting, and from this one shoot you can make any shaped vine required. The spraying of vines for downy mildew is not compulsory, but an application eliminates black spot.

Fruit-fly will make its appearance during the month, and citrus and other fruits are likely to be attacked. Every grower should, therefore, do his best to destroy as many flies as possible, both mature insects and larvæ, the former by trapping or otherwise, and the latter by gathering and destroying all infested fruit. If this work is carried out properly, a large number of flies that would otherwise breed out will be destroyed, and the rapid increase of the pest be materially lessened. The destruction of fruit-flies early in the season is the surest way of checking this serious pest.

Keep a careful lookout for orange-sucking bugs, and destroy every mature or immature insect or egg that is seen. If this work is done thoroughly by all citrus growers there will be far fewer bugs to deal with later on, and the damage caused by this pest will be materially reduced. Destroy all elephant beetles seen on young citrus trees, and see that the stems and main forks of the trees are planted with a strong solution of lime sulphur.

GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The pruning of all deciduous trees should be finished during the month, and all such trees should be given their annual winter spraying with lime sulphur. The planting of new orchards should, if possible, be completed, as it is not advisable to delay. Later planting can be done in the Granite Belt, but even there earlier planting is to be preferred.

Peach trees, the tops of which have outlived their usefulness and of which the roots are still sound, should be cut hard back so as to produce a new top which will yield a good crop of good fruit the following season in from fifteen to eighteen months, according to the variety.

Apple, pear, or plum trees that it is desirable to work over with more suitable varieties should also be cut hard back and grafted. All almond, peach, nectarine, and Japanese plum trees should be carefully examined for black peach aphid, as, if the insects which have survived the winter are systematically destroyed, the damage that usually takes place from the ravages of this pest later on will be materially lessened.

Woolly aphid should also be systematically fought wherever present. The best all-round remedy for these two pests is spraying with black leaf 40.

In the Granite Belt the pruning of vines should, however, be delayed to as late in the season as possible, so as to keep the growth back and thus endeavour to escape late Spring pests.

Where orchards and vineyards have been pruned and sprayed, the land should be ploughed and brought into a state of as nearly perfect tilth as possible, so as to retain the moisture necessary for the proper development of the trees or vines and the setting of their fruit.



PLATE 22.—CASSAVA GROWING AT PLANE CREEK, MACKAY.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

1926.	JULY.		AUGUST.		JULY.	AUGUST
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.46	5.6	6.36	5.20	p.m. 10.57	a.m. nil
2	6.46	5.6	6.35	5.21	11.57	12.51
3	6.46	5.6	6.34	5.22	nil	1.50
4	6.46	5.6	6.34	5.22	a.m. 12.58	2.48
5	6.46	5.6	6.33	5.23	1.58	3.45
6	6.46	5.7	6.33	5.23	2.56	4.37
7	6.46	5.7	6.32	5.23	3.56	5.26
8	6.46	5.8	6.31	5.24	4.53	6.11
9	6.45	5.8	6.31	5.24	5.48	6.53
10	6.45	5.9	6.30	5.24	6.41	7.29
11	6.45	5.10	6.29	5.25	7.27	8.5
12	6.44	5.11	6.28	5.26	8.14	8.37
13	6.44	5.12	6.27	5.27	9.5	9.8
14	6.44	5.12	6.26	5.28	9.29	9.40
15	6.44	5.12	6.25	5.29	10.4	10.13
16	6.43	5.12	6.25	5.29	10.36	10.47
17	6.43	5.13	6.24	5.30	11.6	11.24
18	6.43	5.13	6.23	5.30	p.m. 11.40	12.18
19	6.43	5.13	6.22	5.31	p.m. 12.14	12.58
20	6.43	5.13	6.21	5.31	12.51	1.53
21	6.42	5.14	6.21	5.31	1.32	2.6
22	6.42	5.14	6.20	5.32	2.40	4.3
23	6.42	5.15	6.20	5.32	3.14	5.14
24	6.41	5.15	6.19	5.32	4.15	6.23
25	6.41	5.16	6.18	5.32	5.21	7.31
26	6.40	5.17	6.16	5.33	6.29	8.35
27	6.40	5.17	6.14	5.33	7.36	9.38
28	6.39	5.18	6.13	5.34	8.44	10.42
29	6.38	5.18	6.11	5.34	9.51	11.43
30	6.37	5.19	6.10	5.35	10.51	nil
31	6.37	5.20	6.9	5.35	11.51	a.m. 12.42

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

2 July	)	Last Quarter	11 2 p.m.
10 „	●	New Moon	9 6 a.m.
18 „	☾	First Quarter	12 55 p.m.
25 „	○	Full Moon	3 13 p.m.

An annular or ring-shaped eclipse of the sun will occur on July 10th, visible at places far north of Queensland. North of a line from its south-west corner to a little above Rockhampton a partial eclipse of the sun will be more or less visible when it rises.

Mercury will be at its greatest elongation east (26 degrees 22 minutes) on the 11th. It should be noticeable in the west after sunset.

Jupiter will appear to be near the moon about 3.15 on the morning of the 27th.

1 August	)	Last Quarter	5 24 a.m.
8 „	●	New Moon	11 48 p.m.
17 „	☾	First Quarter	2 38 a.m.
23 „	○	Full Moon	10 37 p.m.
30 „	)	Last Quarter	2 40 p.m.

The conjunction of Venus with the moon on the 6th at 12.5 p.m. should form an interesting spectacle, although the nearness of the sun on the right will detract largely from the beauty of the phenomenon. Venus will appear to be remarkably close to the moon, less than half its diameter above it, and should be observable to the naked eye if due precaution is taken to screen off the sun.

At midnight on the 7th Mercury will be in inferior conjunction with the sun—that is in the part of its orbit which is nearest to the earth.

Saturn will be in conjunction with the moon on the 16th at 7.25 p.m.

Jupiter will be in conjunction with the moon on the 23rd at 8.32 a.m., when it will be four diameters of the moon north of it.

The star Upsilon Aquarii will be occulted by the moon a little before 10.30 p.m. on the 24th. As the moon will be nearly full a pair of binoculars or a telescope will be necessary in order to detect this small star of magnitude 4, 5.

Mercury will be at its greatest elongation (18 degrees 20 minutes) west of the sun on the 25th, and will therefore be visible near the eastern horizon about an hour before sunrise.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

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PART 2.

Event and Comment.

The Current Issue.

An abridged report of the proceedings of the Ministerial Dairy Council, in the course of which Commonwealth and State functions relating to dairy production and marketing were reviewed, is a leading feature of this issue. Mr. Hubert Jarvis has an informative note on the Queensland Fruit Fly illustrated with an excellent coloured drawing, the work of Mr. I. W. Helmsing. The plate is a fine example of the lithographer's art, and for its reproduction we are indebted to the artist, Mr. A. C. Burrows, of the Government Printing Office. Valuable notes on the Woolly Aphis Parasite and the Codling Moth are also contributed by Mr. Jarvis. Mr. Easterby discusses cane crop prospects, and the regular work of the Bureau of Sugar Experiment Stations is well covered. Mr. Edmund Jarvis's useful hints to canegrowers reached us when this issue was on the press and have been held over for the next issue. Mr. Cyril White adds a note on the Milky Cotton Bush to his valuable series on the weeds of Queensland illustrated by Mr. Helmsing, who has, in addition, two finely drawn plates of recently described Queensland plants. A useful article on creamery butter, in the course of which a striking tribute is paid to the quality of Queensland butter, together with another on the ideal dairy cow, are among the selected features. A banana-packing test for Southern markets is described in a report by Mr. Ellison, junior. Mr. Rumball's subject this month is storage of eggs, while seasonable advice on young judges' competitions at agricultural shows is offered by Mr. Shelton, who also contributes other topical observations on pig raising. Other good features makes the August Journal a very readable number.

Scientific Research.

Pests and diseases levy a tremendous toll on our primary industries. The blowfly alone is responsible for enormous stock losses. The sheep tick costs Australia many thousands of pounds annually, and the cattle tick, though largely under control, is just as expensive, and this applies also to other stock afflictions that either reduce the bank balance or inflate the overdraft. It is satisfactory, therefore, to learn that in placing a quarter of a million of pounds sterling to the credit of the Commonwealth Council of Scientific and Industrial Research, the Federal authorities recognise the need for sound scientific investigation into matters that affect vitally national efficiency and economy. Farmers and graziers will look naturally to the Council to give close and practical attention to their own particular problems of field and run. Modern industrial efficiency demands the attachment of fully staffed and equipped scientific laboratories to manufacturing plants. In the industrial sphere Science has come into its own. In the industries of the soil Science, too, must be regarded as an indispensable co-operator, and the laboratory as an essential adjunct to agriculture and its allied activities. It is, therefore, the duty of the man on the land to see that the needs of his industry on the scientific side are recognised adequately by the Council of Scientific and Industrial Research.

Legislating for the Farmer.

In the course of his speech at the opening of the Twenty-fourth Parliament of Queensland on 28th July, His Excellency the Lieutenant-Governor (Hon. William Lennon) foreshadowed a number of new agricultural measures, including proposals to amend or consolidate the Cotton Industries Acts, the Diseases in Plants Act, the Primary Producers' Organisation Acts, the Primary Products Pools Act, the Primary Producers' Co-operative Associations Act, the Land Act, the Prickly Pear Land Act, to cover the arrangement with the Commonwealth Government under the Federal Aid Roads Scheme, and to submit a Water Bill.

Community Interest in Agriculture—The Governor's Speech.

Community interest in our land industries was further evidenced by the Lieutenant-Governor on the occasion of the opening of Parliament in lengthy references to the condition of agriculture in Queensland generally. The yield of sugar for the year was, he said, the largest ever produced. The total Australian manufacture was 505,000 tons, of which the State of Queensland was responsible for 473,000 tons. This yield was due partly to the season and also to the expansion that had taken place in the industry during the last five years. The area under cane was now over 280,000 acres, cultivated by more than 6,000 growers. The total yield of sugar was in excess of the Australian consumption, and some 200,000 tons were exported at a reduced price. This led to the price for cane being lower than in the immediately preceding years. In addition to the Sugar Board, the Legislature had made provision for the establishment of a Canegrowers' Council to represent the industry. This body was elected by the suppliers to every mill in Queensland, and would give the suppliers control of their own affairs and authority to fix their own levies. During the past year the Tully River mill—the largest sugar-mill in Australia—was completed by the Government and commenced actual operations. The machinery of this mill was almost entirely of Queensland manufacture. Already a flourishing township was in existence, and a large population settled on land which hitherto had been covered with dense tropical jungle. In addition to the expenditure on this mill, a million pounds had been expended during the past five years in increasing the capacity and efficiency of other mills in Queensland. His advisers, he said, had fully realised the importance of the proposals for the establishment of a power alcohol industry in this State, and some time since had entered into an arrangement with the Distillers Company, Limited, the International Sugar and Alcohol Co., Ltd., and the Plane Creek Central Mill, Limited, for the erection of a distillery at Sarina for the manufacture of power alcohol from molasses and starch-bearing plants such as cassava. The erection of the plant at Plane Creek was well under way, and operations were expected to commence about the beginning of next year. Negotiations had also been finalised, it was understood, for the erection of distilleries at Cairns and, later on, at Townsville. Further assistance to canegrowers was being provided by the appointment of pathologists and entomologists to assist in the combating of cane pests and diseases. Students were being trained by the Government at the Queensland University, while others were being trained abroad.

The Dairying Industry.

The dairying industry had made, continued His Excellency, satisfactory progress throughout the State, and the opening for settlement of Crown lands in the Upper Burnett and Dawson Valley would result in the creation of important dairying centres in those districts. Noteworthy advance had been made in modern methods of production, and all butter manufactured within the State was the product of pasteurised cream, while pasteurisation of milk in the cheesemaking industry was being gradually adopted. The adoption of the "Kangaroo" brand for all high-grade butter exported from the Australian States had had a beneficial effect on the prices realised by our butter on the London market. The Hamilton Cold Stores had been put into operation during the present season. The provision made for the storage of dairy products was both beneficial and sanitary, while the facilities for loading from the cold storage rooms into the ships' holds guarded against variation of temperature. When visiting this port, the oversea liners of all shipping companies, without exception, had berthed at the Hamilton wharf. The splendid facilities at the disposal of shipping had been favourably commented on by shipping masters, and it was expected that those facilities will be availed of to a greater extent in the near future by all oversea boats.

Wheat.

The wheat industry, controlled as it was by the growers themselves under the provisions of the Wheat Pool Act, was, he said, showing a healthy development. Modern machinery and appliances were being used, and an increase was noted in the area prepared for cropping. Excellent rains for planting had been experienced this year in the Maranoa district, but elsewhere the falls were rather light.

Cotton.

Referring to cotton, Mr. Lennon said that the season now drawing to a close had unfortunately experienced climatic conditions which, on the whole, must be regarded as the worst since the inauguration of the system of Government guaranteed advances. Not only were the conditions in the spring unfavourable to securing a good strike, but a severely dry period in the latter half of the season had considerably reduced the yields in most sections. Results obtained under such conditions, however, had convinced the farmers that, with proper methods of cultivation, the remarkable drought-resisting qualities of the cotton plant would enable a profitable crop to be obtained when other agricultural crops had failed. The 31st July last marked the termination of the agreement between the Government and the British-Australian Cotton Association. The immediate outcome of that has been the establishment of a Cotton Pool and a Board elected by the growers to administer all matters in connection with the marketing of the Queensland cotton crop. Continuing, the Lieutenant-Governor stated that his advisers had endeavoured to establish the industry on the soundest principles, and at the expiration of the agreement believed that under a proper system of development there was a definite future for cotton-growing in Queensland.

Agricultural Organisation.

The various units under the Agricultural Organisation Scheme continued to function actively. The organisation had been placed on a sectional basis, bodies having been set up for each section of the agricultural industry to deal with problems arising therein. The Government had continued, His Excellency added, to give assistance to marketing boards by means of guarantees for overdrafts obtained from banking institutions, for without that assistance it would have been impossible for the boards in question to have carried out their functions. There was, however, an indication that private financial institutions were beginning to view with favour the financing of Queensland marketing boards on an ordinary business basis and on the security of the product, without State Government guarantees. The Director of the Council of Agriculture had recently made a computation of the gain to producers during the last two years by organised marketing, and assessed the figure at a minimum of half a million pounds sterling.

THE DAIRYING INDUSTRY.

MINISTERIAL COUNCIL DISCUSSES CONDITIONS IN THE COMMONWEALTH.

CULTIVATION AND CONSERVATION OF FODDER CROPS.—TOP-DRESSING OF PASTURES.—HERD TESTING AND IMPROVEMENT.—PROPOSED APPOINTMENT OF FEDERAL SUPERINTENDING OFFICER.—DUPLICATION OF SERVICES CONDEMNED.

On 9th June, at Brisbane, in the course of a break in the proceedings of the Interstate Conference of Ministers for Agriculture, the conditions of the Dairying Industry in the Commonwealth were discussed by the Ministerial Dairy Council. Representatives of the Australian Dairy Council were in attendance and were invited to state their views on matters before the Council. On the motion of Mr. W. Forgan Smith, the Queensland Minister, the Conference affirmed the desirability of the Commonwealth Government assisting Agriculture in general and the Dairying Industry in particular, in the form of a subsidy, grant, or bounty, for approved purposes, through the State Departments of Agriculture, and so avoid unnecessary expenditure and overlapping of the activities of the Federal and State Governments. Subjoined is an abridged report of the proceedings.

MEETING OF THE MINISTERIAL DAIRY COUNCIL.

The Ministerial Dairy Council met in the old Legislative Council chamber, Brisbane, on 9th June. There were present:—Sir Victor Wilson (representing the Commonwealth Government); Hon. W. Forgan Smith, Secretary for Agriculture, Queensland; Hon. T. Butterfield, Secretary for Agriculture, South Australia; Colonel the Hon. M. W. J. Bouchier, Secretary for Agriculture, Victoria; Mr. G. D. Ross, Under Secretary, New South Wales; Hon. M. F. Troy, Secretary for Agriculture, Western Australia.

Sir Victor Wilson was voted to the chair, and in the course of his opening address said that an agenda paper had been prepared on behalf of the Commonwealth, which sought the co-operation of the States to the very best advantage of the dairying industry. The Commonwealth aimed, as far as practicable, for uniformity among the States in respect to financing the trade and the development of the industry, and with that object the conference had been constituted. The Ministerial Conference was set up to follow the various other conferences so that necessary action within the States as well as within the Commonwealth might be taken to give practical effect to any resolutions submitted by organisations interested in dairying. They had been asked to meet a deputation of representatives from the Federal Control Board and members of the Australian Dairy Council. He assured the representatives of the States that the Commonwealth had no ambition whatever to impoverish State departments, but desired greater co-operation so that it might be of greater usefulness to the industry within each State. The first item on the agenda paper affirmed the economic principle of increasing production and the national economic importance of the dairying industry to Australia. They realised the importance of the dairying industry to Australia, and of putting it on a sound footing, with the idea of ensuring those engaged in production a decent standard of living, and producing a commodity satisfactory to the people of Australia, and of a quality to commend itself to purchasers on the world's market.

COMMONWEALTH AND STATE FUNCTIONS.

Mr. W. FORGAN SMITH (*Queensland*) said that there were principles about which there could be no difference of opinion. He called attention to certain important factors in item three of the agenda under its sub-headings—

- (a) Fodder production and conservation.
- (b) Manuring of fodder crops and top-dressing of pastures.
- (c) Testing of dairy herds.
- (d) Herd improvement by culling and breeding.
- (e) Appointment of a superintending officer and the necessary organising and administrative staff.

(a), (b), (c), and (d) were matters with which all State departments were dealing. They realised the importance of fodder production and conservation, especially in the matter of eliminating so far as possible the tremendous losses that Australia carries periodically from the effects of abnormally dry seasons. Their difficulty had been that of their not being able to finance a comprehensive scheme that would cope with those difficulties. Queensland had spent a considerable amount of money in this connection and was extending its activities in that direction. The same held good with regard to (b)—Manuring of fodder crops and top-dressing of pastures. That was part of the general work of an Agricultural Department to which departmental officers had given attention and were continuing to do so.

The testing of dairy herds was also an extremely important matter, and they had built up an organisation in Queensland which made provision for that, and he was pleased to say that the dairymen of the State were gradually taking more and more advantage of it as time went on, and were having their herds tested and availing themselves of other facilities offered by the Department.

Herd improvement by culling and breeding was also covered by the activities of the State of Queensland; and they had inaugurated a better bull campaign and advanced as a direct grant to the dairy farmer half the cost of a purebred bull with a view to general herd improvement.

The proposed appointment of a superintending officer and the consequential organising and administrative staff brought them to a matter that required very grave and careful consideration by that Conference. That followed on the proposal to set up an all-Australian organisation, and there appeared to be an idea in the minds of the Dairy Council of establishing a staff to give effect to this all-Australian organisation. He thought that he was stating the case fairly when he said that that appeared, briefly, to be the proposal.

They now came to consider the proposal from the viewpoint, not only of the industry, but of the State Governments and of the Australian people. He had set out that practically all of the proposals contained in the agenda paper were at present covered by the ordinary functions of the State Agricultural Departments, to which they were applying increasing enthusiasm each year. He was opposed to superimposing additional organisations on those already established and which were functioning effectively in the several States. If the State Departments were carrying out the functions for which they had been called into being, then there was no need to superimpose any other organisation upon them. The people of the States provided the money for the carrying out of those activities, and it was the people of the States who would also provide the money for carrying on activities of any other official organisation that might be constituted, and consequently they had to guard against having two costs imposed for the same service or two organisations having the same functions to carry out within the Commonwealth. There were definite functions of the State and there were definite functions of the Commonwealth. He believed in co-operation between the Commonwealth and the State in all activities of that kind, but the functions of the respective bodies should be distinctly defined, and there should be no overlapping in any way if it could be avoided.

How the Commonwealth Could Assist.

The Commonwealth could assist in many ways in the direction of instituting research into agricultural problems. There were serious agricultural problems which affected the interests of every State in the Commonwealth. The States had scientific departments applying themselves to those problems, and often there was not that co-ordination in respect to research that was necessary to secure the right results for the whole Commonwealth. In the direction of that scientific research to which he had alluded—in respect to diseases in plants, pests and other factors that affected the interests of the man on the land—the Commonwealth could assist very materially. Again, in regard to agricultural education he believed that a good deal could be done. The various States had inaugurated systems of agricultural education by means of university grants and by means of the establishment of agricultural

colleges. In Queensland they had the Gatton College, and this year they were establishing a Chair of Agriculture at the University. In New South Wales they also had established very fine institutions for instruction in agriculture. The same applied generally to each of the other States. Having regard to the means at their disposal they had done splendid work in that direction. He believed that it was on those lines that the Commonwealth could materially assist the States.

In regard to herd testing and improvement, he reminded the Chairman of the fact that three years ago, at the opening of the Sydney Show, the Federal Prime Minister spoke very definitely of the necessity of improving dairy herds. His speech was read by him (Mr. Forgan Smith) with considerable interest and approval. Anyone who studied the class of dairy herds in Australia and took into consideration statistics of production could come to only one conclusion—that our dairy herds could be greatly improved, and that improvement would be followed naturally by increased production.

Those points were well known to all, and the Prime Minister suggested that the Commonwealth Government would provide funds to the States with a view to introducing better herd bulls, and in various other ways assisting the activities of the States in that direction. He believed that the Commonwealth and State Governments could co-operate in that direction, and agriculture would be benefited in the States generally. That benefit, too, would pass on to the people of the Commonwealth. It was his belief that the Commonwealth could secure the best results by assisting the several State Departments in the form of bonuses or grants, to be expended by the State authorities—the grants to be to agricultural colleges or universities in the States, and to be devoted to scientific research in agriculture and other activities from which lasting mutual benefit would be derived. He was opposed, on behalf of Queensland, to superimposing another organisation for which the people would have to provide and which would only duplicate functions which could only be performed properly and adequately by one organisation.

Unnecessary Duplication of Services Condemned.

Mr. BUTTERFIELD (*South Australia*) agreed entirely with Mr. Forgan Smith, and it seemed to him that if the Commonwealth were desirous of assisting the dairying industry that could best be done by allowing the work of the Agricultural Departments in the several States to go on as they were, but with added energy that could be given by financial assistance from the Commonwealth Government. The work of the officers in the State Agricultural Departments was limited by the finances of the States. They knew what the duplication of departments meant within a State, and, with Mr. Forgan Smith, he agreed that there should be no superimposition by the Commonwealth Government in regard to the Agricultural Departments of the States. That might not be in the mind of the chairman, but the agenda paragraph referred to by Mr. Forgan Smith read—

“ because of the substantial results already achieved in regard to universal pasteurisation, and the establishment of the National Brand (Kangaroo), the Australian Dairy Council is the only representative body of an all-Australian character available for the successful development of this important work.”

If they contrasted that with the detail work set out in item three of the agenda, it seemed to him to connote the super-imposition of a duplicate body to carry out what is really detail work that could be better done by the States. Expenditure in connection with agriculture was always and must always be on the increase, but he failed to see that any good could come of a duplication of Commonwealth officers in each State and a duplication of expenditure which, of course, was met, as Mr. Forgan Smith well reminded them, by the one set of taxpayers.

Federal Desire for a Working Basis.

The CHAIRMAN (Sir Victor Wilson) remarked that in putting the agenda before the State Ministers on behalf of the Commonwealth he was not fathering it. If the dairy organisations concerned had followed the usual procedure they would have met and remitted their recommendations to him as the Minister for the time being, and that Conference was called for the purpose of considering, as representatives of the States and Commonwealth, the proposals of those organisations. It was not a Commonwealth agenda. He had put them before them as he had received them from the two bodies concerned. They were trying to get a working basis on the lines the two Ministers who had spoken had indicated.

Colonel BOURCHIER (*Victoria*) was in accord with the opinions expressed by Mr. Forgan Smith. While they all agreed that everything possible should be done to improve the conditions of the dairying industry throughout the Commonwealth, he did not think that the suggestions put forward by the Australian Dairy Council

would assist to a very great extent. The Victorian Government was already doing everything possible to encourage the dairying industry in the way suggested in the agenda items. He deprecated the duplication of services that, in practice, the proposals of the Australian Dairy Council would mean. If greater activity were desired in the Agricultural Departments of the several States, then the Commonwealth could assist with a straight-out grant, allowing the States to spend or utilise that money as they thought most necessary, but to suggest that the Commonwealth should step in and carry out the work which their Agricultural Departments were already doing would be a retrograde step. If every attention were not being given to these matters it would be a different question altogether, but they undoubtedly had in their State departments some of the ablest men in the Commonwealth. (Hear, hear!)

Mr. TROY (*Western Australia*) was of the same opinion. He detailed what had already been accomplished by the Department of Agriculture of Western Australia along the lines laid down in the agenda proposals. They all had ample experience of unsatisfactory duplication of Federal and State services.

The CHAIRMAN (Sir Victor Wilson): So far as the Commonwealth Government is concerned, there were no two opinions about the fact that their ambition was to assist and work through the medium of the States. He could assure them that the Commonwealth wanted to work through the States in developing trade and industry. If that Conference could make a concrete proposal as to how the Commonwealth could help financially, he would submit it to his Government. "I admit Queensland has been pushing the interests of the industry very much. I have had a great deal of correspondence with Queensland in regard to it," the Chairman continued, "but we want to treat with the States as a whole and lay down some working basis on which we can give them assistance. I know you are all doing your part, but we are prepared to give that necessary assistance if we can establish a working basis."

Regarding the proposed appointment of a co-ordinating officer, it was very questionable as to whether it would not be better for such an appointment to come under the control of the Bureau of Science and Industry. The Bureau had been reconstructed, and to clearly demonstrate the anxiety of the Commonwealth to obtain the co-operation of the States, it had insisted that the Bureau Council should include one representative from each State, recognising the varied difficulties pertaining within each of the States. The Bureau of Science and Industry would not be fully equipped for doing the work desired unless its activities covered dairying and other primary interests of Australia. He was certain that there would be an officer there who would be in the position of a Federal officer working under the Bureau of Science and Industry; that would largely meet the position as it presented itself to him.

Principles of Government.

Mr. FORGAN SMITH (*Queensland*) said that they had to remember that they were all Australian citizens as well as citizens of a State, and that the funds expended by both Commonwealth and State Governments were raised by the same people, and the function of Government was to secure the best return from the expenditure of revenues provided by the people. He moved—

That this Conference affirms the desirability of the Commonwealth Government rendering assistance to agriculture in general and to the dairying industry in particular; that the assistance should be given in the form of scientific research and/or by means of a subsidy grant or bounty and made available to approved sections of agriculture for approved purposes through the medium of the State Departments of Agriculture, thereby avoiding unnecessary expenditure and overlapping of the activities of Federal and State Governments.

That motion affirmed a definite principle, with which, apparently, they all agreed. He understood that there was no possibility of any Government agreeing to certain proposals that were contained in the agenda submitted to Ministers for their consideration. He believed that the Australian Dairy Council had done good work, particularly in regard to the establishment of the "Kangaroo" brand and export matters generally. They had justified their existence. They had done excellent work on behalf of the dairying industry. The proposals that were before them were really a recommendation for an extension of the functions of that Council. "Governments often find it of value to establish boards for various purposes, but those who understand and appreciate the principles of responsible government will always see to it that in the constitution of these boards the sovereign powers of the State are retained." That was a sound constitutional principle with which every constitutional authority agreed. If they agreed to the proposals of the Australian Dairy Council, it would mean the setting

up of a board with practical administrative powers, which were the functions of government. He would always oppose the appointment of boards with powers which he believed could only be exercised by responsible Governments. Ministers of Agriculture were responsible to Parliament, and Parliament was responsible to the people, and therefore they should at all times respect that responsibility and retain that sovereign power unimpaired. It was a wrong principle to invest any board with powers, either legislative or administrative, which properly were the functions of the several Ministers of the several Governments of Australia, and that appeared to him to be a fatal objection to the proposals of the Dairy Council. He could understand members of the board who put up the suggestions seeing a number of directions in which their functions could be extended. He could realise that men who were zealous to secure reform may advocate those means of reform which seem to them to lie within the realms of possible accomplishment, but they had overlooked—and Ministers could not overlook—the principles he had enunciated—that those powers were to be reposed only in responsible Governments elected by the people of Australia.

How Departments Grow.

Referring to item “(e) Appointment of superintending officer and the necessary organising and administrative staff”—

Mr. Forgan Smith said that he was opposed to duplicating services now performed by the several Commonwealth and State departments. There was no need to establish an office of that kind, nor did they desire to appoint another administrative staff. He knew there was a tendency, once they appointed an officer, for him to have a staff of men about him in a very short period. A British statesman once said that if they appointed an officer in a department and gave him a blotting pad and a packet of stationery and left him to his own resources he would have a big department round about him by the end of the year. They knew that there were things that grew imperceptibly, but still the growth was there. It was quite an easy matter in a department to appoint a responsible officer subject to their control. It was not, he thought, in the interests of good government that some organisation should be able to establish another office with a staff to discharge functions which are now capably discharged by State officers, or who could be detailed for that particular duty. They had already set out what the Conference of Ministers considered to be desirable in connection with agricultural education and extension and in which the Commonwealth could rightly help.

Colonel BOURCHIER (*Victoria*) seconded the resolution.

Mr. H. RANKIN (Chairman of the Australian Dairy Council) and Mr. C. E. D. Meares (Commonwealth Dairy Control Board) were invited to address the Conference on the proposals submitted by their respective organisations and which were embraced in the agenda submitted on their behalf by Sir Victor Wilson.

After further discussion the motion was carried.

OTHER RESOLUTIONS.

Annual Dairy Produce Competitions.

The Conference affirmed the principle of holding annual interstate butter and cheese educational competitive exhibitions under official auspices, the competition to be held, wherever practicable, in each State alternately.

Uniform Grades and Standards.

Mr. FORGAN SMITH (*Queensland*) moved, with a view of obviating the present confusion and of securing the necessary uniformity of grading throughout Australia, that the following standards be adopted by Commonwealth and State officials:—

Butter—Choicest, 92 points and over. First, 89 to 91 points. Seconds, 86 to 88 points. (To be packed under a registered number only and not to carry the name of the State or word “Australia.”) Pastry, 85 points and under. (To be firebranded “Pastry,” packed under a registered number only, and not to carry the name of the State or word “Australia.”) Cheese—Choicest, 92 points and over. Firsts, 89 to 91 points. Seconds, 86 to 88 points. Thirds, 85 points and under.

Colonel BOURCHIER (*Victoria*) seconded the motion.

Mr. E. GRAHAM (*Queensland*) explained that the proposal was made in the interests of uniformity, and that the standard had been agreed upon by experts and others concerned.

Carried.

After further discussion on relatively minor matters the proceedings terminated.



FIG. 1.—Eggs, enlarged ten diameters.



FIG. 2.—Larva, enlarged five diameters.

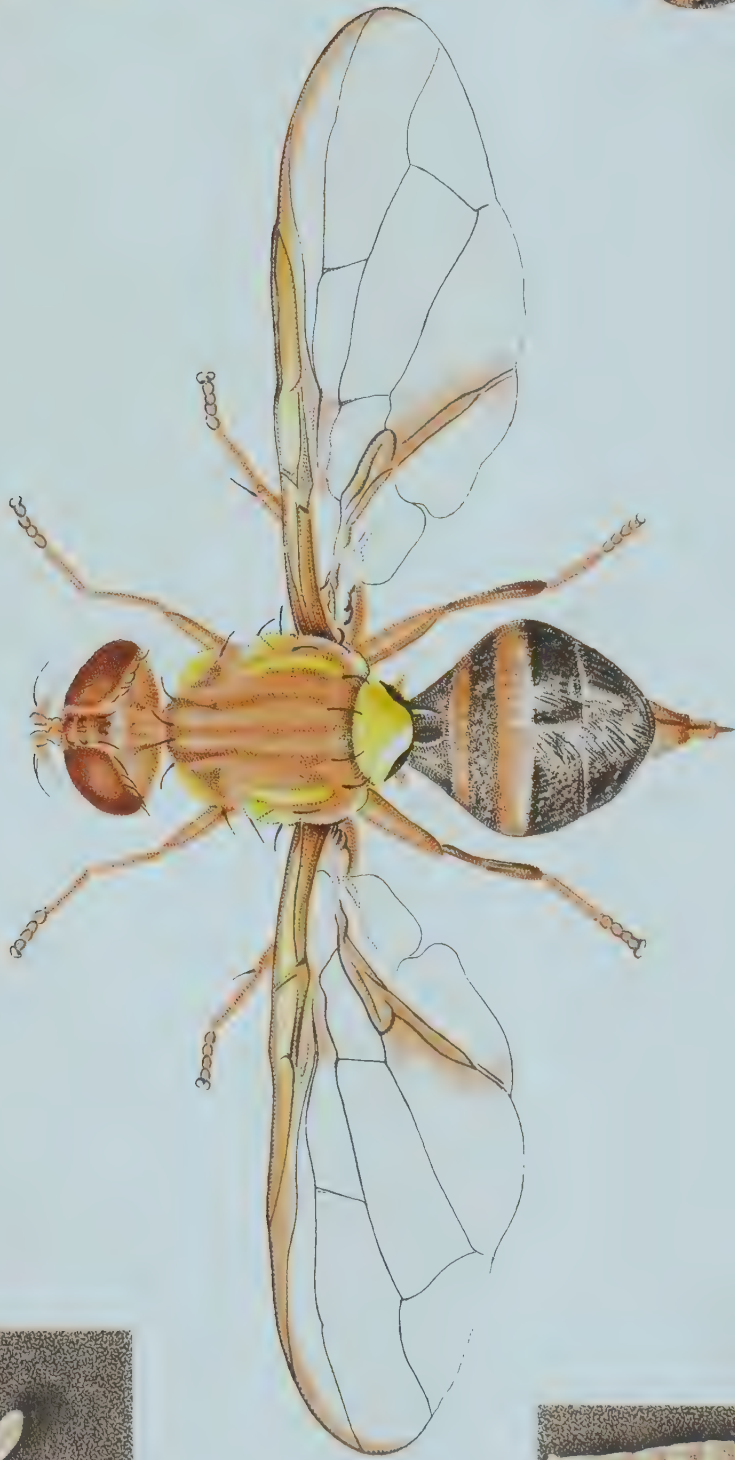


FIG. 4.—Female Fly, enlarged ten diameters.

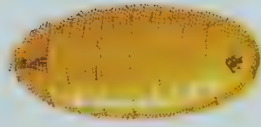


FIG. 3 —Puparium, enlarged five diameters.



FIG. 5.—Abdomen of Male Fly, enlarged ten diameters.

L. W. Helmsing. 1926.

THE QUEENSLAND FRUIT FLY

(*Chaetodacus tryoni* Froggatt).

By HUBERT JARVIS.

Although nearly all fruitgrowers are familiar with the damage to fruit caused by the maggots of the Queensland Fruit Fly, comparatively few are acquainted with the adult fly itself, and this leaflet is written with the object of enabling the orchardist to both recognise the fly and to become acquainted with the best known means of dealing with this notorious fruit pest. The Queensland Fruit Fly was first discovered in 1889 by Mr. Tryon, who at that time very carefully investigated this fruit pest, working out its life history, and suggesting certain measures of control.

Nature of Injury and Economic Importance.

The injury to fruit occasioned by the fruit fly is due to the developing maggot (larva), which, mining in every direction, breaks down the tissue of the fruit, setting up a rot, which soon renders the fruit unfit for market.

In stone fruits, such as peach, nectarine, and plum, the maggots develop more rapidly than in the harder pomaceous fruits, such as apple, pear, and quince.

The economic loss occasioned by this fruit pest is very great, and in one district alone may be estimated at very many thousands of pounds sterling annually.

Fruits Attacked.

The more important fruits attacked by the Queensland Fruit Fly are as follows:—Peach, nectarine, apricot, plum, cherry, apple, pear, quince, citraceous fruits, banana, custard apple, granadilla, mango, papaw, persimmon, passion fruit, fig, and grape. It has also been bred from date, cape gooseberry, walnut, and tomato.

General Description and Life History.

The fly (*see* accompanying plate) is about the size of a large house fly, but is somewhat wasp-like in shape. In colour it is reddish brown, with pale lemon-yellow markings on the thorax or middle part of the body. The eyes in life are dark red shot with purple (resembling an opal); this colour, however, fades in death to a very dark brown.

The Egg (Fig. 1).

The egg of the fruit fly is about one thirty-second of an inch in length, elongated, and tapering at both ends; in general colour it is creamy white.

The eggs are laid by the female fly in the ripening fruit by means of the ovipositor; this is an organ comprising a spear, or puncturing instrument, and a tube through which the eggs are deposited. On

opening the puncture made by the ovipositor, the eggs can readily be seen by means of a pocket lens. The fly usually lays from six to eight eggs in a puncture. The egg-laying capacity of the female has not yet been definitely determined, but, in specimens dissected, from fifty to sixty eggs have been found present in the ovaries. The eggs hatch in about forty-eight hours in warm weather. The fly does not deposit living maggots in the fruit.

The Larva or Maggot (Fig. 2).

The young larva or maggot, on hatching from the egg, at once starts mining and boring into the fruit, breaking down the tissue by means of a very efficient pair of hooked jaws, which are rapidly extruded, and withdrawn, the action resembling that of a pump.

The maggot when full grown attains the length of about half an inch; it is creamy white in colour, and of a slender form tapering from the anal end of the body towards the mouth parts. It possesses the remarkable power of jumping a considerable distance by contracting its body in the form of a loop, and suddenly releasing same.

Under suitable conditions, i.e., a soft fruit and warm temperature, the maggot can reach maturity (become full grown) in from five to seven days. When full grown the maggot leaves the fruit and enters the soil, working its way down to a depth seldom exceeding 2 inches. It then pupates.

The Puparium (Fig. 3).

The puparium resembles a small cylinder in shape, with rounded ends; it is yellowish brown in colour, and about a quarter of an inch in length and just under one-eighth of an inch in diameter; within this puparium is formed the true chrysalis or pupa. The chrysalis stage in summer weather is of about a week's duration, but this period may be protracted in cold weather to many months.

The Adult Fly (Figs. 4, 5).

On emerging from the soil the adult fruit fly crawls up the nearest support and dries its wings, and is ready for flight in an hour or so. About fourteen days must elapse before the newly emerged female fly is ready to deposit eggs. The life cycle of the fruit fly from the egg to the adult insect is approximately about three weeks under summer conditions.

The adult flies feed readily on almost any sweetened liquid, and have been kept alive by the writer on honey and water for a period of four months.

Natural Enemies.

The Queensland Fruit Fly has several enemies, both parasitic and predatory. The true parasites live and operate within the host; they are small wasps belonging to the order Hymenoptera.

Predators, comprising insects of several different orders, prey both on the maggots and also on the adult fruit flies.

The true parasites play the more important part in helping to reduce the numbers of the fruit fly.

True Parasites.

The first parasite of the Queensland Fruit Fly was bred out by Mr. Tryon in 1889. This insect is a small reddish wasp of slender build, and belongs to the family Braconidae, being known to science as *Opius tryoni* Silvestri. It is about a quarter of an inch in length with an ovipositor measuring from three-sixteenths to one-quarter of an inch in length. It deposits its eggs in the maggots of the fruit fly, and it locates the maggot by repeatedly probing the fruit with its ovipositor. In the native host fruits of the fruit fly, this parasite undoubtedly plays an important part in certain seasons, in helping to control the fruit fly, by destroying a very large percentage of the maggots.

It is also operating against the fruit fly in cultivated fruits, having been bred by the writer from peaches and citraceous fruits.

Dr. T. Baneroft, of Eidsvold, Queensland, has recently succeeded in breeding several new parasites, and some of these, judging by the number reared from maggot-infested fruit, appear to be doing good control work in regard to fruit fly.

Predatory Insects.

Several ground beetles of the family Carabidae prey on the maggots of the fruit fly as soon as they leave the fruit. These beetles may often be seen running quickly about underneath the fruit trees, and sheltering under leaves, weeds, and rough pieces of soil; they are about half an inch in length, and of a shining bronze colour. They are doing very useful work indeed and should be protected.

Dragon flies (*Odonata*), Robber flies (*Asilidae*), Mantids (*Mantidae*), and all spiders are also useful in the orchard, preying as they occasionally do on the adult fruit fly and other insect pests.

Control Measures.

The control measures at present known embrace the following procedures:—(1) The gathering and destruction, by boiling, burying, burning, or drowning of all infested maggoty fruit; (2) the trapping of the adult fruit fly by means of glass fly-traps baited with fruit-fly lures; (3) the spraying of the fruit trees, or a portion of same, with a fly poison combined with some substance attractive to the fly and on which it will feed; (4) the exposure in the trees, in tins or other suitable receptacles, of substances giving off an odour repellent to flies.

The gathering and destruction of all infested fruit is undoubtedly of the utmost importance in controlling the local increase of fruit flies.

Trapping with fruit-fly lure has given encouraging results; thousands of fruit flies can be so trapped and destroyed, thereby reducing to some extent the number of flies present in a certain area.

Poison-bait sprays have also given results that warrant further experiment in this direction, and it is hoped that more definite information as to the usefulness or otherwise of this method of control will be shortly available.

For those wishing to try a poison-bait spray the following formula is supplied:—Molasses, 4 lb.; arsenate of lead, paste form 5 oz., or powder form 2½ oz.; water, 4 gallons. If desired, instead of using

four gallons of water, three gallons of water and one gallon of fruit juice (made by boiling any fairly good waste fruit) may be used. It is claimed by some that by the addition of fruit juice the bait is rendered more attractive to the fly.

Several orchardists using repellents claim to have had good control results.

Summary of Control Measures.

Gather daily all infested fruit and destroy same by boiling, burying, burning, or drowning.

If burying the fruit is chosen as a means of destruction, see that there is eighteen inches at least of soil above the fruit.

Drowning, where this is possible, is a very effective means of destroying the maggots of the fruit fly. An old well or tank can often be used. Fruit when placed in water quickly ferments, thereby destroying all fruit-fly maggots that may be present in such fruit. Fruit-fly maggots cannot live in water more than a very few days.

Burning infested fruit is safe and sure, if carried out properly—i.e., a good ample hot fire made first, and the fruit placed on the fire.

Boiling is also an effective means of dealing with maggot-infested fruit, but the practice of spreading boiled fruit about the orchard is a dangerous one and to be strongly condemned, as such fruit will give off an aroma likely to attract the fruit fly into an orchard where this practice is resorted to.

Clean culture as far as possible is a great help in controlling fruit fly as, in an orchard comparatively clean, fallen fruit can easily be seen and quickly gathered, whereas in an orchard where thick weeds, &c., are present, the gathering of fallen fruit is very difficult, and moreover many individual fruits will be overlooked and remain to breed fruit flies.

Use traps and lure if possible consistently, not forgetting to set traps early in the season—at least three or four weeks before the first fruit is ripe. A few flies caught early in the season are better than hundreds trapped later on.

Set traps on boards if practicable, as better results have been so obtained than by simply hanging the trap on a wire or string. Hang boards (with a wire to each corner) in a good-sized, leafy fruit tree, never in an open tree. Add about one teaspoonful of lure to each trap every twenty-four hours if possible; this will replace evaporation. Clean out the traps once a week and reset.

Traps and lure are obtainable at almost any store in any fruit-growing district in Queensland, but, if difficulty is experienced in procuring either traps or lure, information regarding the same may be obtained by application to the Department of Agriculture and Stock, Brisbane.

Conclusion,

Co-operation is essential if the best results are desired. All orchardists in any particular district where damage from fruit fly is experienced should co-operate in the work of controlling the fruit fly, for nothing is denied to well-directed co-operative effort.

THE WOOLLY APHIS PARASITE.

(*Aphelinus mali* Hald.)

By HUBERT JARVIS.

The woolly aphis parasite, *Aphelinus mali* Hald., is a native of North America, where it has been known since 1859 as a parasite of the woolly aphis (*Eriosoma lanigerum* Hausm.).* It was introduced into New Zealand by Dr. R. J. Tillyard in 1920.

In April, 1923, application was made to Dr. Tillyard for a supply of this parasite for the Stanthorpe district, and in compliance with this request a consignment of parasitized aphids was received in August, 1923.

LIFE HISTORY OF PARASITE.

The Egg.

The female *Aphelinus* parasite deposits her egg, or eggs, within the body of the woolly aphis; this she accomplishes by stabbing the aphis with her ovipositor and at the same time inserting an egg. Sometimes more than one egg is laid in each aphis,* but not more than one can develop in each individual aphis. Egg-laying is continued throughout the life of the female *Aphelinus*.* It has been found possible for one female *Aphelinus* to lay as many as 140 eggs during her life.* Dr. Tillyard mentions sixty eggs as an average number laid by each female.

The Larva (Fig. 1).

The young larva of *Aphelinus* is slightly elongated; when full grown, however, it fills out, and becomes pear-shaped, and is almost broader than it is long. The larva of the parasite feeds on the internal tissues of its host, and finally completely devours the body contents.

The Pupa or Chrysalis (Fig. 2).

When full grown the larva of *Aphelinus* transforms to a pupa or chrysalis within the empty hardened shells of the dead woolly aphis, where it is protected from enemies. Here it lies dormant until ready to emerge. The pupal stage appears to be of about ten to twelve days' duration according to the temperature.

The Adult Insect (Fig. 3).

When the adult *Aphelinus* is ready to emerge, it cuts a circular hole in the shell of the aphis and comes out into the light. On emerging, its first instinct is to feed, and after it has fed mating takes place almost immediately.

The adult is about one twenty-fifth of an inch in length, and not unlike a very minute honey-bee in shape. The female is generally a little larger than the male insect. According to experiments carried out in America by Mr. A. E. Lundie, the adult has been kept alive for forty-two days. Specimens fed on honey and water in the Stanthorpe Insectary lived for twenty-one days, hence the average length of life of the adult *Aphelinus* appears to be about two or three weeks under Stanthorpe conditions.

* Arnold E. Lundie. Biological Study of *Aphelinus mali* Hald. (Cornell University, Agricultural Experiment Station, Memoir 79.)



FIG 4



FIG 5



FIG 1



FIG 2



FIG 3

PLATE 23.—THE WOOLY APHIS PARASITE *Aphelinus, mali*.

Fig. 1.—Larva of *Aphelinus mali* $\times 40$.

Fig. 2.—Pupa of *Aphelinus mali* $\times 40$.

Fig. 3.—Imago or adult of *Aphelinus mali* $\times 30$.

Fig. 4.—Twig showing parasitized and unparasitized woolly aphis, all those on the lower colony being parasitized, whereas only a few on the lower edge of the upper colony have been attacked. Natural size.

Fig. 5.—Aphis showing the emergence holes of *Aphelinus mali* $\times 6$.

W. H. HENNING
1926

Duration of Life Cycle.

The period occupied in the development of the *Aphelinus*, from the egg to the adult insect, is about a month; thus from five to six broods would be possible in the Stanthorpe district during the season.

Appearance of Parasitized Aphids (Fig. 4).

An aphid in which the *Aphelinus* has deposited its egg soon becomes sick and does not live many days; in some cases parasitized aphids will, after being stung, crawl away from the colony, while others remain stationary. Parasitized aphids soon lose their woolly covering, becoming black and swollen, and at a later stage the circular hole (Fig. 5) through which the parasite has emerged can, on a close inspection, be seen with the naked eye.

Distribution of the Woolly Aphis Parasite in an Orchard.

The parasite can easily be spread throughout an orchard by simply pruning cuttings from a tree on which it is established and distributing these cuttings about the orchard, tying one or two of the cuttings among the branches of suitable trees (i.e., trees exhibiting a good supply of woolly aphid). When once the parasite is established in one or two trees it will soon spread throughout the orchard without any further help.

Effects of Spraying on *Aphelinus*.

It is not advisable to spray the trees on which it is desired to establish this useful insect parasite, but, when once the *Aphelinus* is established in an orchard, spraying may be carried on as usual for codling moth, fungus diseases, &c., and the parasite will suffer little harm.

It is advisable to help the parasite by spraying the trees once during the winter for woolly aphid. This will clean up the colonies developed in the autumn after the *Aphelinus* has ceased to operate. This winter spraying will not seriously hurt the hibernating parasite.

Hibernation.

The woolly aphid parasite passes the winter in a variety of situations encased in the shell of the dead aphid. Some may be found in cracks in the soil, and under stones, leaves, &c.; others remain on the trees on the branches, and under loose bark, &c. The bandages sometimes placed around the trees for codling moth often contain hundreds of parasitized aphids. These bandages, if such are used, and all the prunings from infested trees, should be saved and placed in a cool situation, such as under a house or packing shed, and should be enclosed in a sound box or tin. These prunings, &c., can be placed out in the orchard in the spring, when hundreds of parasites will hatch out and start work on the woolly aphid if this is present.

Earliest Emergence in the Stanthorpe District.

Although an occasional parasite may hatch on a warm day during the winter, the first general hatching in the Stanthorpe district is about the end of August. From this date until the end of April the parasite continues active; should cold frosty weather be experienced towards the end of April it will, however, cease working, and little useful work is accomplished by the *Aphelinus* after the first frost.

Concluding Remarks.

The woolly aphis parasite has already accomplished very good work in the Stanthorpe district by destroying a large percentage of the woolly aphis, and thereby reducing the number of sprayings usually necessary in order to control that destructive apple pest.

Operating as the parasite does during the fruit season, when the duties of the orchardist are many and insistent, the saving of time and money during this period is especially valuable.

The woolly aphis parasite is steadily multiplying in the Stanthorpe district, and it is only reasonable to conclude that the good work already accomplished by this insect will continue to increase.

SHOULD DAIRY FARMERS READ BOOKS?

There is an old saying that "practice makes perfect," and, true as this may be in relation to many of the arts, he would be a rash man who would say that a lifetime of farming practice perfected the farmer in his forecast of what may happen to-morrow. For that is what the farmer is up against all the time.

He learns from boyhood much that his father has absorbed and much that others who work upon the farm can tell him out of the fount of their experience, he trains his mind to understand, and his muscles to make themselves apt, in the various operations of which farm practice is made up, but the area from which he draws his knowledge is limited, unless in the course of his training he moves from farm to farm, or rather from one farming district to another, in order to reap the knowledge that has grown up from the ripened experience of other men under varying conditions of soil, climate, and established local custom.

Certainly farming covers such a wide area of activities that no young man can learn the whole in the course of a few years, even if he does move about and keep his eyes and ears open. And always there may come a time when an opening occurs, in order to take advantage of which he must turn to departments of farming where he has little actual experience.

He finds that he will have to occupy himself in some feature of stock farming with which he is not familiar, or grow crops that have not before been numbered among those he has been able to study in field practice.

Taking all this into consideration, there is no doubt that nowadays it pays the farmer to train himself to read. We have known scores of men, grown so accustomed to being out in all weathers, tiring themselves with work and supervision in the fresh air to such an extent, that to spend more than a few minutes in glancing at the weekly paper indoors sends them to sleep where they sit. They work hard; they make the most of conditions on the farm as they understand them, but they get to understand new conditions so late that they are often behind the times, and only follow the men who try new ways as soon as they learn sufficiently of them to feel they can put them into profitable practice for themselves.

The use of "artificial" manures took a lot of introducing, but now, within limits, everybody believes in "chemical fertilisers," and many thousands of tons are used every year in this country alone.

The man who thought reading was worth while was first in the field in this advantageous knowledge. He took the earliest opportunity of inquiring into the matter, and of seeing trial plots demonstrating what the new form of manure might be expected to do on his farm. And this is the man who still suffers least from too highly priced manures, because he knows how to buy and check the value of his purchases without waiting to be taught by the chance conversation of other men, or by the hard experience of a bad bargain.

The economical value of purchased cattle foods is also very much a matter for careful consideration, this time based upon a knowledge of the comparative value of food constituents from a scientific point of view, and affords another instance of the value of special knowledge. Standard rations are carefully worked out by agricultural authorities, and the individual farmer should know enough to modify general schemes to his own particular profit, by changing them on sound scientific lines, to suit the convenience of his own food stocks, and the state of the market in relation to what he needs to purchase among the many concentrated foods that are offered him.—"The Dairy."

THE CODLING MOTH.

(*Cydia pomonella* Linnæus.)

By HUBERT JARVIS.

General History and Distribution.

The first occurrence of the codling moth in Australia was recorded in 1883, during which year it made its appearance in South Australia. It was identified in New South Wales in 1887, and in Queensland in 1889. It is now present in every apple-growing centre in the Commonwealth.

In Queensland it has spread with great rapidity during the last twenty years, and the losses due to the codling moth, in apple and pear growing districts, have been very great, and this pest, in the districts mentioned, must be ranked as second only in importance to the notorious fruit fly.

Nature of Injury and Fruits Attacked.

Codling moth injury is directly due to the larva or caterpillar eating its way usually from the calyx end, right into the centre of the fruit, where it finally devours the pips, causing the fruit attacked to ripen prematurely, and to fall from the tree. Such fruit is usually undersized and quite unfit for market.

In Queensland the following fruits are attacked:—Apple, pear, quince, peach, nectarine, and plum; codling moth occurrence in the three latter fruits is, however, rare.

Life History—The Egg (Fig. 1).

The egg of the codling moth is a tiny pearly-white object, more or less oval in outline when viewed from above; it is about the size of a very small pin's head, and is just discernible to the naked eye. The eggs are laid in a variety of situations: often in or near the calyx, and sometimes on the young fruit and leaves of the tree. The egg usually hatches in about ten days, but the duration of this period is largely governed by temperature.

The Larva or Caterpillar (Fig. 2).

The caterpillar, on hatching from the egg, is about an eighth of an inch in length; when full grown it measures just under three-quarters of an inch. In colour it is creamy white, shaded with pink; this latter colour is more noticeable in the older caterpillars.

The newly hatched larva either makes its way into the calyx, or burrows beneath the skin of the fruit, where it eats out a small cavity, stopping the entrance with excreted particles or frass webbed together with silk. When the young grubs perish, as they often do, without causing any further damage, the small injuries inflicted by them are known as *dings*. The most common point of entrance in the apple is at the calyx, or flower end; sometimes, however, the larva enters from the stem end, and often, in the later broods, directly from the side of the

FIG 1

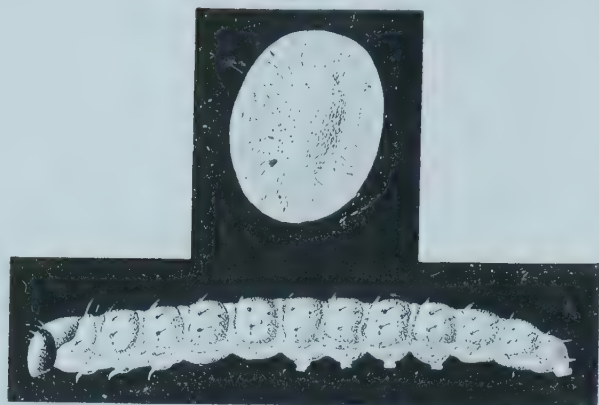


FIG 2

FIG 4

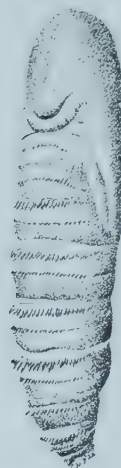


FIG 5



FIG 3

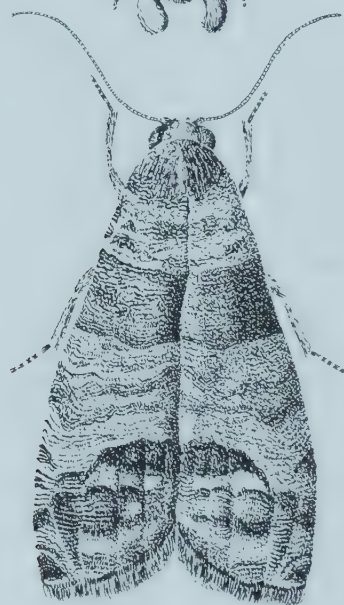


FIG 6

FIG 7



14 HELMSMAN
1926

PLATE 24.—THE CODLING MOTH (*Cydia pomonella* Linnaeus).

Fig. 1.—Egg of codling moth $\times 15$.

Fig. 2.—Larva $\times 4$.

Fig. 3.—Larva and pupa in silken cocoons $\times 2$.

Fig. 4.—Pupa $\times 4$.

Fig. 5.—Moth or imago with wings spread $\times 5$.

Fig. 6.—Moth or imago with wings folded $\times 5$.

Fig. 7.—Correct time for first spray.

fruit. The excreted matter passed by the caterpillar during its progress is pushed behind it, and it can usually be seen in the form of a brown coarse dust, projecting from and blocking the mouth of the tunnel.

The larval period usually occupies about twenty days. When full grown the larva leaves the fruit by an exit tunnel, which it bores for the purpose; it then crawls underneath any convenient shelter in the orchard, such as a piece of loose bark, or into a fissure formed by the intersection of two branches, or in fact in any suitable hole, crack, or crevice which it can find, either on the tree or near to it. It then spins a tough silken cocoon (Fig. 3) inside which it turns to the chrysalis or pupa.

In the packing sheds the codling moth cocoons may be looked for in any cracks in the walls, floor, or packing bench, or in the corners of any old stored cases; they are somewhat difficult to see owing to the grub's habit of weaving little pieces of chewed wood fibre into the silken cocoon, thus matching closely their surroundings.

The Pupa (Fig. 4).

The chrysalis or pupa of the codling moth is about five-eighths of an inch in length and one-eighth of an inch in diameter; it is of a shining brown colour. The empty pupal cases may often be seen protruding from the cocoons on the trees in the orchard. The average pupal period is of about ten or twelve days' duration, but this period also is very variable.

The Imago (Figs. 5 and 6).

The codling moth measures about three-quarters of an inch across the expanded wings (Fig. 5); it is of a rich chocolate-grey colour, with a beautiful oval patch of copper-coloured metallic scales at the tip of each fore wing; the hind wings are lighter in colour, and are finely fringed at the edges.

When at rest (Fig. 6) the moth folds its wings closely across the body, and is thus quite inconspicuous. The moths will feed on almost any slightly sweetened liquid, and the average life of the moth is about fifteen days.

The female is usually ready to oviposit about four or five days after emergence. The average number of eggs laid by each female is about forty, but the number varies greatly.

The number of broods possible during one season is governed by altitude and temperature; in some countries only two broods are recorded, but during the normal Queensland summer three broods are possible. The average life cycle, or period of development from the egg to the moth, varies from five to eight weeks.

Codling moths may often be seen flying in the orchard in the day time, but they are more active just at dusk, at which time oviposition usually takes place. More moths seem to emerge from the cocoons in the afternoon than at any other time of the day; they do not travel far, and those bred in the orchard would probably remain there. They are, however, capable of flying half a mile or more, and may, of course, be carried by strong winds to a considerable distance.

Over-wintering.

The codling moth passes the winter in the larval or caterpillar stage; practically all the last brood larvæ overwinter in this way. Towards spring they assume the chrysalis form, and in due course the moths emerge in time for the first blossoming apples.

Control Measures—Spraying.

Happily the codling moth can be to a great extent controlled by efficient spraying, combined with strict cleanliness in all orchards, store-houses, and packing sheds. The fact has been demonstrated in almost every country where the pest occurs.

At least four sprayings with arsenate of lead are necessary in order to effectively control codling moth. The calyx or first spray should never be omitted, and it should be followed by three cover sprayings at intervals of from two to three weeks. The calyx spray should be applied as soon as the petals have fallen, before the calyx is closed (Fig. 7). The poison can then be driven well into the calyx cups, through which the majority of young codling moth larvæ enter. A thorough spraying at this time is of the utmost importance in controlling the pest.

The second spray should be applied about fourteen days after the calyx spray; the young apples are then well formed, and by covering them with the poison they are protected against the attack of the caterpillars which are daily hatching from the eggs laid by the early brood moths. A third spray should be applied about three weeks after the second spray, and a fourth spray is recommended about three weeks later. In America as many as six sprays are used in codling moth control. Where possible a power spray should be used, at a sufficient pressure to form a mist-like spray. The amount of pressure required will, of course, vary with the type of outfit used.

Some authorities recommend the addition of a spreader to the codling moth spray; arsenate of lead and water when mixed alone tend to separate into droplets, but this defect is overcome by the addition to the mixture of a spreader which makes it possible to distribute an even surface of poison.

The most satisfactory spreader to use is calcium casenate; this product is put on the market in convenient tins and can be purchased at reasonable cost. It is already used extensively in Australia by many orchardists. A 1-lb. tin of calcium casenate is sufficient for about 100 gallons of spray fluid.

Arsenate of lead either in paste or powder form is the best poison to use for the control of codling moth; any well-known brand should be purchased and used at the strength of—Powder form, 1 lb. to 50 gallons, or paste form, 2 lb. to 50 gallons. The spreader may be added to the spray during the mixing or when mixed.

Paste arsenate of lead should be first mixed with water to the consistency of thin cream before being added to the spray; powder arsenate of lead may be sprinkled into the tank through a muslin bag or a fine sieve while the tank is being filled. The spray mixture should be kept thoroughly stirred during application; this is accomplished in most spraying outfits by means of a paddle or mixer worked from the engine.

Other Control Measures.

The importance of cleaning up and destroying all codling moth infested fruit in the orchard cannot be too greatly emphasized. Packing sheds and storehouses should also be thoroughly inspected and cleaned up in the autumn; the cracks between floor boards and in packing benches should be carefully examined and treated with boiling soapy water into which also all stored and returned fruit cases, if such are used, should be immersed. Apple-trees having loose bark should be scraped with an old piece of hoop-iron or similar implement, and any holes, cavities, &c., likely to harbour codling moth grubs should be stopped with putty or a good sticky clay. Bandaging trees, although not now resorted to as much as formerly, is a very good way of trapping the caterpillars, and, provided that the bandages are examined periodically and the grubs destroyed, bandaging is a method of control well worth while. Bandages should be in place in the Stanthorpe district about the end of October; they should be of good strong cloth a foot wide folded lengthwise to six inches, and placed right around the tree with the folded edge uppermost; they can be kept in position with one nail placed at the upper edge, which should fit tightly to the tree, allowing the bandage to hang loosely at the bottom. Bandages should be examined once a fortnight.

Systematic thinning of the fruit is also of great importance; codling moth larvæ will enter sometimes where apples touch; this cannot of course always be avoided, but a heavy crop of undersized fruit is a danger, and is the best possible breeding ground for codling moth; it is also more difficult to spray such fruit than it is a rightly thinned crop.

Trapping the moths by means of a lure is now being tried in New Zealand and other countries, and so far encouraging results have been obtained. Experiments with codling moth lure will be carried out in the Stanthorpe district during the coming season 1926-7.

Dual or Combined Spraying.

If it is desired a combined spray can be used; either atomic sulphur or sulphate of iron can be mixed with the arsenate of lead, thus making the spray effective both for codling moth and powdery mildew of the apple. Atomic sulphur should be used at the strength of 10 lb. of atomic sulphur to 100 gallons of the arsenate of lead spray; if sulphate of iron is used, 6 lb. of the sulphate of iron to 100 gallons of the arsenate of lead spray is the correct quantity.

Concluding Remarks.

Use a good brand of arsenate of lead at the strength recommended; excess of poison, besides being wasteful, will result in spotting of fruit; a similar result will follow spraying too late in the season.

Never omit the calyx spray, and spray the fruit thoroughly from two sides both inside and outside the tree; the leaves need not be covered at all. Realise that neglected orchards are a danger to neighbouring clean orchards.

Finally, remember that co-operation is essential if the fullest measure of success is to be achieved in the control of this very serious pest.

Bureau of Sugar Experiment Stations.

CANE CROP PROSPECTS.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, who has returned from an extended visit to most of the sugar-cane areas, from Bundaberg north, states that the dry season experienced has to a large extent cut down the estimates formed early in the year. Practically every sugar-mill in the State has reduced its estimate, some of them quite considerably. While it is still expected there will be a surplus, it will not be large, and the price paid to growers and millers should be much better than last year owing to smaller export. An estimate of this year's crop will be issued shortly.

Bundaberg cane was a good deal backward, but a heavy fall of rain in this district, followed by warm, sunny weather, has improved the outlook to some small extent, though the crops will be on the light side.

At Mackay there is a very fair crop, but not so good as that of last year. At Plane Creek the foundations for the new power alcohol distillery are well under way. Storage tanks to hold approximately 1,250,000 gallons of molasses have been completed. The estimated cost of the distillery is about £35,000, and the factory will cover about $1\frac{1}{2}$ acres. There are to be five open molasses vats and three closed vats for fermenting cassava starch. Steam will be supplied by the Plane Creek sugar mill. It is proposed to use both mill molasses and the cassava roots in the manufacture of power alcohol. Cassava was seen growing in several parts of the Plane Creek district, and has made good progress. It is hoped that the distillery will be ready for operations about December. This, the first power alcohol plant in Queensland, will be watched for results with the utmost interest by all interested in sugar growing. Messrs. Barbat and Sons, of Ipswich, are erecting the plant. It is proposed to follow this by the erection of another plant to treat molasses in the Cairns district.

The Marian mill management at Mackay has made extensive additions and alterations to plant. These include a new steel building for the crushing-house and three new mills, 6 feet by 35 inches, with independent drives. The mills were made by Fletcher and Co., of Great Britain. A new 20-ton Calandria pan with 1,800 square feet of heating surface has been installed. This is 12 feet in diameter. The syrup capacity has been increased by 7,000 gallons. Two travelling gantries have been constructed, also new superheater, additional fugals, and 3 feet 6 inch loop line in yard. An additional Wolverhampton boiler, with 6,000 square feet of heating surface, new chimney, Ingersoll Rand pump, crystalliser, new locomotive shed, and extension of heavy rail tramlines are also included in the improvements.

Proserpine has also suffered this year, and a large quantity of cane has been affected by the drying up of the foliage. The new cane area at Banana Pocket looked well, and some exceptionally fine Badila cane was inspected. Many improvements have been carried out at the mill, including a new pan, set of effets, and new Babcock boiler. Recent additions have cost in the vicinity of £40,000.

Very little cane is now being grown at Bowen for the Proserpine mill, the irrigation facilities being on too small a scale; dry weather, too, has seriously interfered with prospects.

At Home Hill some remarkably good cane was seen where irrigation had been constantly employed; other patches that had no water were dying. On the whole, however, there should be a good crop for the Inkerman mill. The irrigation scheme is working satisfactorily, and farmers are receiving much benefit from it.

The Lower Burdekin was very dry, and non-irrigated cane looks nearly as backward and dried up as it did in 1915. Irrigated cane is much better, but even this is not so far forward as is usual. Another noticeable feature is the small amount of young plant cane visible. This time last year large areas of beautiful young cane were seen. The quantity of pumping done this year has been enormous, and irrigation plants have been kept going almost continuously. Poor cane is being used as fodder for sheep which have been brought in from the West.

Kalamia mill has recently added four crushing mills to its plant (5 feet by 30 inches) to supplement its previous four sets of 4 feet 6 inches by 30 inches. These have been grooved according to latest practice. A new superheater and subsider have been installed; two new Babcock boilers have been erected, together with a new set of quadruple effets, adding 7,500 square feet of heating surface as well as new boiler feed pump, new condenser, and five new fugals. Six miles of 3 feet 6 inch tramline have been converted to 2 feet, and a 3 feet 6 inch line for haulage of sugar built from mill to North Coast Railway. A new spray system is being constructed for cooling, and new chimney stack 100 feet by 6 feet 6 inches. A new sugar store has been erected of 3,500 tons capacity, and 200 new cane trucks provided. Altogether, over £100,000 has been spent in improvements in the course of the past twelve months.

South Johnstone and Goondi cane areas are also backward when compared with last season, but the cane shows a great improvement nevertheless on most of the Southern areas. The cane in the new Tully areas is also backward this year. Grubs are doing damage on the Daradgee lands.

At Babinda the effect of grubs is not so marked as in previous years. There is a fair crop this year, and the mill expects to crush up till about the end of the year. Hambledon mill, near Cairns, has a very fine crop, and so has Mulgrave. Both mills were crushing smoothly. The new area at the Little Mulgrave is a fine piece of cane country on the way to the new Range road, and some remarkably good Badila cane was seen on this land.

Highly successful Field Days were held at the Sugar Experiment Stations of Bundaberg, Mackay, and South Johnstone. The attendance at the Mackay Station constituted a record, there being 600 growers present. At Bundaberg the Principal of the Gatton Agricultural College, Mr. Murray, delivered a highly interesting address on tractor costs, while at Mackay Mr. John Reid, editor of the "*Queensland Agricultural Journal*," gave a special address to farmers on agricultural education and publicity work, which was listened to with the greatest attention.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received from Mr. N. L. Kelly, Assistant to Pathologist, the following report (21st July, 1926):—

Mackay Areas.

The majority of farmers in this district are showing considerable interest in disease control, with the result that the incidence of disease is very slight and scattered, with the exception of Red Rot, which will probably be as serious as in 1925.

Mosaic was noted in about 2 per cent. of the farms visited, being perhaps more in evidence around Farleigh, though North Eton and Sarina are not entirely free. In the Mackay district the main spread seems to take place in the planting, secondary infection through corn aphides being important only where corn or Shahjahanpur 10 or the grasses which harbour the aphid abound. Control measures have been elaborated in a previous report.

Gumming disease does not show in the leaf except in vigorously growing stools or those that have lately been growing well, hence an effective survey would be unsuccessful during the present drought. It was observed near Dumbleton and at Lindley Creek, Sarina, in D. 1135 only, also at the Sugar Experiment Station. Eradication, avoidance of knife infection—sterilise knives in hot water after cutting an infected crop—and careful selection of seed should eliminate the disease from the Mackay district.

Red Rot was most widely distributed, though nowhere had it reached serious dimensions as yet—July. At Plane Creek it was found in M. 189, M. 1900, Q. 813, and H.Q. 426. Around Mackay M. 1900 was by far the most seriously damaged. The disease is secondary to bad growing conditions, wherein the cane reaches maturity some time before harvesting. If dry conditions continue the resistance of the stool is weakened, and the comparatively weak parasitic fungus attacks the cane, entering probably through a split rind or artificial wound. The fungus *Colletotrichum falcatum* abounds everywhere, but appears to be more troublesome in acid soils.

Control.—

1. Do not plant infected sets, though in very favourable conditions the shoots may resist infection.
2. It may bring relief to plant a little later, cultivate longer, and harvest earlier.
3. Restore alkalinity, humus, and texture of the soils by applying lime and green manure.

It is a pity to abandon the useful M. 1900 without a trial of these measures.

The Cane-killing Weed.—This weed was found in various localities, mainly on new forest land, and causing comparatively small damage. The weed, a *Striga* species, belongs to the family Scrophulariaceae (to which also the snapdragon belongs). Under natural conditions it probably parasitises a grass, for unless its root pierces the root of another plant it dies, as it cannot take in sufficient liquid food to keep itself alive for long. It is a prolific seeder, but careful preparation of the land induces the seeds to shoot, and, in the absence of a host plant, to die off. Affected canes are usually considerably stunted, with leaves narrowed and unhealthily pale in colour. The more or less square-stemmed weed can be found near the base—usually dead at this time of the year.

FIELD REPORTS.

The following field reports have been received by the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

The Southern Field Assistant, Mr. J. C. Murray, reports (20th July, 1926):—

Coolum.

Seasonal conditions have been favourable for growth. Growers here have the best cane in the Southern District this year. Q. 813 has made extraordinary growth. N.G. 15 has also done well; Q. 970 is making a good showing. Growers are gradually overcoming drainage difficulties. Growers are recommended to experiment with fertilisers with the object of obtaining definite data. There is abundant humus in these soils, but humus alone is not sufficient.

A farmer would be wise to keep in view the following laws:—

- (1) A soil can be termed fertile only when it contains all the materials requisite for the nutrition of plants in the required quantity and in proper form.
- (2) With every crop a portion of these ingredients is removed.
- (3) The essential plant foods, therefore, must be replaced.

An analysis of a soil typical to Coolum shows:—Humus, 8.99, very good; nitrogen, .465, good; readily available phosphoric acid, .0091, low; readily available potash, .0095, fair.

The most important effect of drainage is that it makes the soil warmer. A wet soil is cold, chiefly because the water in it is constantly evaporating, and evaporation is a cooling process. Moreover, water is a poor conductor of heat; wet soils warm in the sun slowly because the water they contain holds down the temperature. Warmth is one of the chief essentials for the germination and growth of cane; it is the coldness of a poorly drained soil more than the mere excess of water it contains that is responsible for most of the unsatisfactory growth of crops on it.

Maroochy River.

There are some very good crops of cane in this area. Q. 813 has made the best showing; in fact, when this variety is planted the chances of getting a good harvest are excellent. Growers are recommended not to cut this cane too early in the season. If they do a shy ratoon is to be expected. Wait, if possible, until after the middle of September.

There is a popular idea that Q. 813 is resistant to Mosaic disease. On the contrary, while Mosaic is not frequently seen in Q. 813 it is most susceptible to injury. On this account this disease is very readily recognised in this variety. The important thing is to get rid of Mosaic altogether, and, owing to its remarkable effect on Q. 813, its recognition and consequent elimination is comparatively easy. Other varieties of cane doing well are H. 227 and Pompey. The latter was introduced by the writer some time ago from the Childers district, and is making a good showing. The Hawaiian variety is also doing well and improving as time goes on.

Many writers deprecate the value of bringing a number of varieties into a district, but where organised experiments cannot be carried out the next best thing is for the farmers to conduct local experiments. The value of this is amply demonstrated in this area. Since 1918 the Bureau has been experimenting through local farmers, with the result that as soon as staple canes showed signs of deterioration the Bureau was able to indicate a further group of useful canes, including Q. 813, Q. 970, and H. 227.

Yandina.

Cold checked growth in this area. Some very fine crops are in evidence, however, particularly round Bridge's. The majority of the growers are not going in exclusively for cane, but are also cropping legumes and turnips. Varieties doing well in this area are H.Q. 285, Q. 813, M. 1900 Seedling, and D. 1135. B. 208 is also making a good showing. This cane is very susceptible to Mosaic, but it has a very high sugar content. Farmers growing B. 208 should take great care in plant selection.

Cooroy.

At one time quite a lot of cane was grown in this district, but at present farmers find other pursuits more profitable. Only very small areas are now in existence. Standing crops, however, look well, and if farmers continue to plant they could profitably use more M. 1900 Seedling. This cane has a peculiar liking for high, well-drained, volcanic soils and is a profitable variety when it can be grown.

The Northern Field Assistant, Mr. E. H. Osborn, reports (22nd July, 1926):—

Lower Burdekin.

Rainfall records since last October:—

				Ayr. Inches.		Home Hill. Inches.		Giru. Inches.
October	..	..	..	—	..	—	..	—
November	..	..	..	·27	..	·30	..	·6
December	..	..	..	1·22	..	·30	..	2·03
January	..	..	..	1·42	..	2·11	..	3·95
February	..	..	..	8·11	..	6·38	..	7·82
March	..	..	..	1·60	..	1·18	..	3·42
April	..	..	..	—	..	—	..	—
May	..	..	..	—	..	—	..	·20
June	..	..	..	—	..	—	..	·14
				12·62	..	10·27	..	17·62

These figures indicate the abnormal dryness of the season.



PLATE 25 —PLANT E.K. 28, THIRTEEN MONTHS OLD,
GROWN AT BURKE BROS., DRYNIE (AYR).

Home Hill.

The township is still making progress. Crops were very patchy. Inkerman had just started crushing and reported that a lot of last season's stand-over was fluctuating very much in quality, some of the B. 208 and Giru being very inferior. Plant Badila was, however, very fair, but nearly all the cane was weighing light.

Ayr.

Practically the same conditions were prevailing upon the northern side of the river as in the Home Hill areas, and the available cane for harvesting this year will fall a long way below last season's bountiful crop. Continuous irrigation had been

carried out by growers who had cane to cut. Several paddocks where no water had been spared were only passable, and its condition suggests that, however helpful irrigation may be, it fails to give the best results without at least moderately good weather conditions.

Varieties.—The cane that has shown up to best advantage this year is E.K. 28. Among the many good blocks seen, a 6-acre thirteen months plant crop belonging to Messrs. Burke Bros., near Pioneer, was excellent. It will probably cut from 55 to 60 tons per acre, and is standing well up. It has certainly had plenty of water, but so has the adjoining Badila. (See illustrations.)

B. 208 has not given its usually good returns this year; it does not seem to be a cane that will stand too much adverse weather.

H.Q. 426 (Clark's Seedling) is also below its usual standard here this year, and M. 1900 was only medium.

N.G. 15 Badila is a very good cane, and, considering the season, some wonderfully fine crops were observed.

Q. 813, being a very shallow rooter, does not do too well under very dry conditions.

Diseases.—It is rather hard to differentiate between loss caused by disease and abnormal dryness in a year like the present one. Leaf Stripe to a rather larger extent than usual was noticed in plant B. 208. In one case the plant crop was noticed to be infected to a slight extent some eighteen months ago, and was pointed out to the grower with reference to his using seed from the same block, but as one corner of the paddock seemed quite clean the owner took the risk of using some for plants, after very careful selection. The resultant crop, however, is now very heavily infected, and a serious loss in tonnage is inevitable. His best plan now is to plough out as soon after harvesting as possible, clean, fallow, or plant leguminous crops after having quite killed the last vestige of cane in the block, and subsequently plant with a resistant variety such as Q. 813 ten or twelve months after.

Mosaic was noticed in H.Q. 426 and a few stools of Badila had suffered from Top Rot on the Home Hill and also on the Ayr side.

Giru.

Here the dry conditions were also very marked, more especially as Giru is not blessed with such a splendid underground water supply as Ayr and Home Hill. There are several farms with a very fine supply of open water to draw from, and where this has been taken full advantage of the cane has responded; but in nearly all cases the crops are a long way below last year's; the total quantity expected being about 30,000 tons, against 78,000 tons for last season.

Very little planting had been possible, although a good deal of ground was in course of preparation. The prospects for 1927 are anything but good.

Varieties.—Cane that shows up to greatest advantage during the present dry time is E.K. 28, and if it carries as good a density in general as it does in odd places then its popularity is assured. In several places some young cane of this variety was seen growing, and seemed to have struck well.

Diseases.—Mosaic was noticed in B. 208, first ratoon, about a mile away from two farms on which it was noticed some eighteen months ago, also in B. 208. Now it is learned that all these plants came from the same place. This again shows the absolute necessity of careful seed selection.

The Northern Field Assistant, Mr. A. P. Gibson, reports (21st July, 1926):—

Cairns.

Improvements.—Extraordinary progress continues in Cairns and surroundings. New and more modern buildings are being constructed. Extensive road improvements are under way, the more general use of motors is speeding up the necessary work. Great quantities of sugar are coming in by rail and hurried South on more spacious freighters. The town has been wisely planned, and is destined to become one of magnitude and importance in the near future.

Seasonal.—The season for the greater part has been abnormally dry, only 44 inches of rain has been recorded to the 10th July, 22 inches of this total fell towards

the latter part of January. About the 20th June, and at intervals since, high and gusty south-easters blew; this had an increased drying effect on the soil and tumbled some of the more advanced crops, especially that having its root system partly severed by the cane grubs.

The Crop.—Adverse conditions have not been favourable for big crops. Early cane estimates of the eight most northerly mills totalled 1,270,000 tons; this tonnage, if realised, would have yielded about one-half of Australia's sugar requirements, a later estimate has reduced the total by some 50,000 tons.

On the whole the cane is of moderate length, the foliage is surprisingly green considering the unfavourable season, but is now rapidly browning, more especially that growing on the drier highlands. Fine crops were seen on the very fertile alluvial deposits of the Lower Barron and Mulgrave Rivers. Present quality is very satisfactory considering the earliness of the season.

Grinding and Harvesting.—These operations are proceeding smoothly. Factories have not reached their possible maximum weekly cane tonnages. The small but surprisingly powerful locos. are bringing forward enough cane to keep the big factories moving continuously for the full running time. The bulk of the cane being treated is short of stem, moderately clean, and unburnt. It is remarkably free from rat and borer destruction, and improving daily in quality.

High Ground and Top Cutting.—Appalling waste in tons of cane and sugar results from improper cutting, subsequent ratoons are also seriously affected. The heaviest and sweetest part of the crop is near the ground, therefore, it is of immense importance that the crops be harvested as near the ground surface as possible. Much unnecessary trash is picked up with the cane.

Railroads.—The Cairns district has a good system; the fields are laid out for speedy crop removal by portables.

Arrowing.—Widespread purple stretches among the waving sea of green cane is due to the beautiful cane flower. Flowering marks the end of the growing period of affected canes. The time to which cane can be left standing after arrowing depends mainly on variety and season.

Planting.—Much ground had been planted. The stage of growth varied from primary shoots just bursting through the soils to well-established stools. The quality of the strike was found to be all the way from poor to excellent. The depth of soil overlying the plants varies from 2 to 5 in., according to season; when the soil is dry a greater covering is required than when moist. Improperly prepared or lumpy ground is responsible for poor strikes, mainly due to lumps preventing the thorough encasing of plants by the much required pulverised soil. Not sufficient care is exercised when selecting cane for seed, this should be selected from disease-free plant cane or vigorously growing stubble. The time has come when we must pay more attention to the details of the industry. The rind or skin of cane when cut into seed by blunt knives is shattered, thereby permitting fungi to gain entry to the sets; for the same reason all plants damaged by vermin should be eliminated. It is highly possible that organisms responsible for diseases are transmitted from one cane to another by direct inoculation.

Earthing Up.—Soil thrown by implements on to the newly planted cane reduces manual labour by weed smothering and is often of benefit, but when abused has detrimental effects. Mechanical injury often follows when removing this surplus covering.

Manuring.—Offal from nearby slaughter-houses is being applied to a few resting fields. The growing of leguminous crops is not being practised to the extent that it should.

Ratooning.—When the cane is harvested the greater part of the old root system dies, therefore ratooning should be performed as soon as practicable or prior to new roots forming.

Diseases and Pests.

We must endeavour to control our diseases and pests or they may control the industry. This control can be assisted by encouraging their natural enemies and destroying, where possible, the breeding places. Gumming, Leaf Scald, Leaf Stripe, Top Rot, Red Rot of Sheath, Brown Rot, and Pineapple diseases were noted.

Gumming.—This exists, but is not spreading apparently. Pronounced gum-like streaks were located in H.Q. 426. When the stem was severed gum immediately oozed from the vascular bundle; other canes having similar leaf markings did not contain the gum. Leaves obtained and tested under the microscope at Meringa confirmed the presence of bacteria responsible for the disease.

Leaf Scald.—This continues to spread; red fibre, similar to gum, is also found in this disease.

Leaf Stripe.—The disease had not spread, the severely affected canes had mostly died. Ratoons generally are more troubled than is plant; sets from infected canes transmit the condition.

Top Rot.—The red streaks observed in the foliage in January last had disappeared. Canes troubled with the complaint were found.

Red Rot of Sheath.—The whole leaf sheath becomes red and the disease passed on to the stem.

Pineapple Disease.—Primary shoots of newly planted cane were found dying or dead, the interior of affected sets varied in colour from crimson red to black, and had a pineapple odour, hence the name.

Brown Rot observed only on the virgin lands.

Cane grubs, rats, weevil, and moth borers so far have not damaged the crop to any great extent, seasonal conditions seem to control them. Minor pests, such as mid-rib borers and bud moth borers were noticeable, more so on the fringe of grassy headlands.

Molasses.—Cane had been planted on a portion of the land at Mulgrave over which molasses was gravitated. A good strike followed, save where the portion was intersected by the gravitational drains. The portion receiving overmuch is still in an unplatable condition.

The Mulgrave district tonnages, with their respective c.c.s. averages for season 1925, will be found interesting:—

District.	Tons.	Peecentages C.C.S.
Little Mulgrave and Pyramid	11,600	13·39
Riverstone	8,700	14·50
Meringa and Yattee	23,700	14·40
Heighleigh	45,080	14·10
Over River and Aloomba	42,400	14·15
Behana to Fishery Creek	37,500	13·96
Eubenangee, Bellenden Ker, &c.	10,000	12·42
	178,900	14·00

Variety Tonnage and C.C.S. Average for Season 1925.

Variety.	Tons.	C.C.S. Percentages.	Crop Percentages.
N.G. 15 (Badila)	122,000	14·16	67·9
D. 1135	41,200	13·47	23·0
H.Q. 426	8,300	14·67	4·6
Other varities	8,200	13·67	4·5
	179,700	14·00	100·0

A Beautiful Valley.

Little Mulgrave is a beautiful valley, with its fertile soil tucked in by wooded uplands. It is served by a small railroad and drained by two sparkling running rivers, not deep but picturesque, and one through which Nature has permitted the construction of a winding but comparatively easy crossover to the good land beyond.

The Southern Field Assistant, Mr. R. W. Mungomery, reports (19th July, 1926) :—

The greater part of the Mackay district, with the exception of the Homebush and Sarina areas, was visited in the course of June, and, on the whole, insect damage has not occasioned great losses in these areas. This is quite unusual considering the abnormally dry season these districts have suffered, for it is widely recognised that insect damage in a dry year is always more than in a wet one, since the vitality of the plant through continued starvation is impaired during a dry spell and the plant

readily succumb to attacks, especially if it happens that roots are affected. This does not imply that insect damage is not bad on individual farms, for I have witnessed some very serious damage in parts, and one outstanding case came under my notice in which a field of 6 acres of first ratoon cane, containing mixed varieties and averaging about 20 tons per acre, was eaten out completely. This will be an absolute loss to the grower. Other blocks though badly eaten were holding out, and arrangements were made by the farmers with the mill authorities to have the cane harvested at the commencement of the crushing season.

Mackay also proved interesting from the variety of the insect fauna found there, and although various southern species were observed, most of the injurious cane insects taken included those which are essentially northern in their distribution. The following pests were observed doing damage:—

The Greyback (*L. albohirtum*).

Serious destruction from these grubs occurred at Barecoo, and in the Farleigh area and at Mount Jukes. In the latter area there is an estimated loss of 2,500 tons of cane this year and most of the affected fields will have to be ploughed out. On another estate one farm which suffered so badly this year was under cane thirty years ago and had to be abandoned owing to the grubs making canegrowing unprofitable then. It was taken up two years ago, cleared of its lantana, and planted with cane. Grubs appeared last year in the plant crop in small patches, but the invasion of the first ratoons this year has been complete, and scarcely a green stick remains. Thus this completely upsets the theory that spelling the land will rid it of grubs, for I have even seen cane in new land fall a victim to these insidious workers.

At Owens Creek, Kungurri, and part of the Pinnacle Plain there are a few grubs, but it is difficult at a casual glance to differentiate between the effects of dry weather, frost, and grubs, all of which have left their mark there. However, I understand that injury from this pest in these localities has not been so far-reaching as in previous years.

In a few farms in the Racecourse area patches of Q. 813 were eaten out, and I blame the presence of small feeding trees (Moreton Bay Ashes) right up against the cane for the appearance of grubs on these farms. Moreover, the variety Q. 813, as well as H.Q. 426—*i.e.*, Clark's Seedling—should never be planted in areas subject to grub attack. In compact localities like Racecourse, farmers could most profitably cut down, ringbark, or poison these feeding trees and put an end to this menace for all time, and it was particularly encouraging to see when I visited this locality at a later date that several had acted on advice. Shire Councils as a rule do not favour indiscriminate destruction of trees on roadways for they add much to natural beauty. Grubs now are mostly full fed and have gone down deeper into the soil to pupate, but a few had evidently recently (about 12th June) changed into their third stage, thus giving evidence of a prolonged fighting season of the beetles last year, as pointed out by Mr. Jarvis (see "Queensland Agricultural Journal," June, 1926).

The Weevil Borer (*R. obscurus*).

The cane borer was found at Farleigh, Mount Jukes, Finch Hatton, Sybil Creek, and Kungurri, but its damage this year is not great. This I attribute to the unfavourable conditions for its development during the past season, for it seems that only cane which grows rank and lies down is especially favourable for the increase of this pest. Farmers, too, are getting more careful about seed selection, and one finds most of them rejecting bored cane when cutting plants. This is to be commended; but what happens to the rejected material? One invariably finds it lying about the field near the spot where the plants have been cut, and if left for a few weeks without being burnt weevils emerge and migrate to other fields, where they continue to multiply. So the futility of such a practice can be realised. This season, when very little cane in the districts harbouring these pests will be left to stand over, should be an excellent one in which to clean up paddocks of old borer-infested cane and leave no breeding grounds for the weevils. If this be carried out conscientiously by all concerned a big reduction in the pest should follow.

The Soldier Fly (*M. rubriceps*).

This species still confines its attention to Finch Hatton and the surrounding districts, and at the time of my visit the insect was represented in its pupal and imaginal forms and therefore could not be classed as doing any actual damage then. The pupae were located at from 1 to 1½ inches below the surface of the ground, and they much resemble the larva, since metamorphosis takes place within the old larval skin, so that it is quite natural for farmers to make the mistake and assume that the insect is present as a larva or "maggot" throughout the whole year, whereas there

is a decided quiescent pupal period about May and June, when it would be quite safe to plant. Probably one other such period occurs in the summer months. Pupæ were also found under blady grass (*Imperata arundinacea*), whilst the flies were seen flying about a field of potatoes, which crop Mr. Dormer suggested might be useful for rotation. It will be interesting to see in the spring whether these flies have oviposited in the soil there and what measure of success has attended this crop rotation. One fact is established—that they have not been found to attack potato roots or tubers. Wireworms have been damaging sets in the low-lying parts of Mackay, particularly in the “devil pan” type of country, and much good might be done by draining and otherwise improving the physical condition of the soil. Later planting may also help to lessen their attack.

Wallabies, Scrub Turkeys, and Cockatoos.

All are worthy of note as doing a fair amount of destruction in scrub country. Turkeys hollow out the big sticks of Badila which usually grow on new scrub land, and they further destroy great lengths of cane which snap off when the weight of the bird comes on the higher portions above the pieces they have hollowed out. This damage was seen at the Gorge, Finch Hatton. At Septimus a block of Q. 813 was being visited by a flock of cockatoos, which ate the mature cane about a foot above the ground, and in one patch alone I estimated that about 1 ton of cane had been destroyed, and it had been almost spoilt from a ratooning point of view. Wallabies, owing to the scarcity of their native grasses this year, have eaten both mature and young ratoon cane.

I would like to bring before the notice of all growers in the Mackay district the excellent provisions made by the members of the Mackay Pest Destruction Board. Not only does the Board encourage the destruction of beetles by payment on the pound basis, but growers are refunded half the cost of any fumigant, &c., approved by the Bureau of Sugar Experiment Stations which may be used by them in the control of cane pests. Growers therefore are working under excellent conditions, and they cannot sincerely express the opinion that the cost of soil fumigants is prohibitive. They should take fuller advantage of this liberal concession.

TWELVE MILK PRODUCTION RATIONS.

Twelve good examples of suitable production rations for cows giving milk of normal quality are given in Leaflet No. 388, issued by the British Ministry of Agriculture, as follows:—

- (a) One part by weight of dec. groundnut cake and two parts of maize meal; $3\frac{1}{4}$ lb. per gallon.
- (b) Two parts of bean meal and one part of maize germ meal; $3\frac{1}{2}$ lb. per gallon.
- (c) One part of dec. groundnut cake, two parts of rice meal, and two parts palm kernel or coconut cake; $3\frac{1}{2}$ lb. per gallon.
- (d) Coconut cake, or palm kernel, or maize gluten feed, singly or mixed; $3\frac{1}{2}$ lb. per gallon.
- (e) Three parts of beans, two parts of barley meal, and one part of linseed cake; $3\frac{3}{4}$ lb. per gallon.
- (f) Two parts of oats, one part of dec. cotton cake, and one part of coconut cake; $3\frac{3}{4}$ lb. per gallon.
- (g) Equal parts by weight of oats, bean meal, and maize gluten feed; $3\frac{3}{4}$ lb. per gallon.
- (h) Two parts by weight of bean meal and one part rice meal; $3\frac{3}{4}$ lb. per gallon.
- (i) Three parts of oats, two parts of dried grains, two parts of palm-nut meal, and one part of dec. cotton-seed meal; 4 lb. per gallon.
- (j) Two parts of dried grains and one part of coconut cake; $4\frac{1}{4}$ lb. per gallon.
- (k) One part of oats, two parts of bean meal, and one part of bran; $4\frac{1}{4}$ lb. per gallon.
- (l) Three parts of Egyptian cotton cake, three parts of dried grains, and two parts of maize meal; $4\frac{1}{2}$ lb. per gallon.

It will be noticed that the quantity to feed varies from 3 to $4\frac{1}{2}$ lb. per gallon of milk, according to the particular foods that are being used. For Jersey or Guernsey cows the quantity should be increased by one-fifth—i.e., $3\frac{1}{2}$ to $5\frac{1}{2}$ lb. per gallon of milk. A farmer should always consider whether it would pay him better to sell his home-grown foods and buy something in their place. Cases often occur where it would be profitable to sell maize gluten feed or grain.

ABSTRACTS AND REVIEWS.

All foreign agricultural intelligence in this section, unless otherwise stated, has been taken from "The International Review of the Science and Practice of Agriculture," published at Rome by the International Institute of Agriculture.

The Fertilisation of Pasture by Liquid Manure, with Relation to the Utilisation of the Nitrogen of Liquid Manure for Green Fodder Production.

LIECHTI, P. and RITTER, E. Ueber die Wesendüngung mit Gülle. "Landwirtschaftliches Jahrbuch der Schweiz," Vol. 35, p. 1, 1921.

The authors have studied a problem of paramount importance for the Swiss agricultural industry. The first point to settle was to find the most suitable yearly application of liquid manure for a soil. A light, to medium heavy, lime-deficient, sandy soil, was divided into a number of meadow plots, each of an area of 50 square metres and each manured. The exhaustive results are arranged in thirteen tables, each table of several pages, and the following are the main conclusions:—

(1) In a liquid manure fertilisation of grass land only larger amounts of manure give a good yield of nitrogen, smaller amounts, even if repeated several times, give comparatively high losses of the nitrogen by evaporation.

(2) When using large amounts of liquid manure large amounts of lime also reach the soil, but these can only be utilised if at the same time large quantities of phosphatic manure are supplied.

(3) Large amounts of liquid manure produce a lime-deficient fodder, and this unfavourable action of the manure can be counteracted by a heavy application of lime.

(4) Liming of the soil brings about both an improvement in the quality of the fodder and an increase in the crop.

(5) Potassium phosphate manuring alone, resulted always in diminished crop, but potassium phosphate and liquid manure gave an increased yield.

(6) Each addition of fertiliser brings about a simplification in the botanical constituents, the clover varieties are repressed, but the albumin content of the fodder does not suffer.

(7) Fertiliser conditions or weathering conditions influence the water content of the grass but little; the grass has the lowest water content on unfertilised plots.

(8) Non-nitrogenous fertilisers give a grass of better quality, but nitrogen containing fertilisers give a much heavier crop. The profits from nitrogenous manuring are considerable.

(9) If it is not possible to apply a nitrogenous fertiliser, a high nitrogen crop can be obtained by a simple potassium phosphate manuring. In these experiments the crop per hectare per year was 40-200kg. on non-limed plots and 70-230 kg. on limed plots.

Diversification of Crops.

"Tropical Agriculture," Vol. II., No. 5, pp. 93-94. Trinidad, 1925.

The recent depression in certain tropical products brings into prominence the fact that one-crop areas are based upon an unstable economic foundation. While the main crop is in demand at remunerative prices the country prospers, but when any disaster overtakes this crop the whole area is thrown into profound depression. Much may be said in favour of specialization of large areas, but the inherent danger of the system should always be remembered by planters and administrators.

A well-known example of a one-crop area is that of the coffee industry of Ceylon, which was prosperous until in 1868 the disease *Hemelia vastatrix* appeared and practically destroyed the industry. Other crops were then cultivated, and salvation was ultimately found in tea, which was introduced on sound economic lines; although the failure of the Ceylon tea industry would be very serious for the island, owing to the introduction of other crops, such as cinchona, cinnamon, rubber, and coconuts, the effect of failure of tea would not be so disastrous as was the case with coffee.

A more recent example is that of the rubber industry of Malaya, and also that of Ceylon, in this case due to over-production, with the consequent fall in market prices.

Another instance is that of cocoa; the production of the Gold Coast rose from 39,000 metric tons in 1912 to 194,000 tons in 1923. Recently prices fell, owing to a variety of causes, with serious results to the producing areas.

A remedy may lie in co-operation to extend the market, to limit production, or by publishing reliable information regarding stocks and supplies. The chief remedy, however, lies in a greater diversification of crops.

The danger is again illustrated on a smaller scale by the failure of the lime industry at Montserrat, brought about by disease, hurricanes, and competition of the Italian lemon industry.

There are many minor crops in the tropics which could be developed into profitable industries if they received adequate attention.

The need for practical recognition of the necessity of broadening the economic basis of those tropical areas whose fortunes are founded upon the continued prosperity of one main crop.

Fruit Storage Experiments in Denmark.

Experiments in the storage of apples and pears were begun in 1918 at Blangsted (Denmark) in a building erected in 1917 and consisting of an ordinary cellar and a cold storage plant of fruit. Comparisons were made between storage of apples and pears in cellars and in cold storage rooms at temperatures of 4·5, 3·5, 2·5, 1·5, 0·5 deg. C. Other experiments were carried out in cellars and cold storage rooms which were (a) unventilated, (b) ventilated, (c) with the addition of ozone.

The main results were as follows:—

The keeping power of fruit varies greatly from year to year. All varieties of apples and pears kept much longer in a cold storage room than in a cellar. During the winter months, after removal from cold storage, fruit kept fresh for at least two weeks, with the exception of the variety *Nouveau Poiteau*, in which core rot was found. The flavour of apples does not seem to be affected by the temperatures or duration of storage. Pears picked before they are ripe do not obtain a good flavour when ripened at a low temperature. Some varieties lose flavour under protracted storage. Ventilation with outer air or the generation of ozone, does not seem to increase the keeping power of fruit. Scabby fruit does not keep as well as sound fruit. Wrapping the fruit in tissue paper seems to have no preservative effect, but generally enhances its beauty. Fine, dry, powdered peat as a packing material increases the keeping power of fruit by one month or more. Large fruits do not keep as well as smaller ones from the same tree.—“Ice and Cold Storage,” Vol. XXVII, No. 317, London, 1924.)

Ground-Nuts.

Strenuous efforts are being made in Gambia to improve the quality of the ground-nuts (“Ann. Rep. Dept. Agric., Gambia, 1924, p. 24), and considerable attention is being paid to seed selection. Using raised platforms on which to stack the nuts is another means advocated, as this will prevent the development of moulds which cause the blackening of the shells and spoil the appearance of the nuts. Owing to the common practice of mixing sand and other foreign materials to increase weight, an ordinance has been passed making it compulsory to screen all nuts purchased or stored for export. The screening removes sand and dirt and also the majority of shrivelled and immature nuts. Reference to the use of rotary screens in Gambia, and an illustration of one at work, were included in the article on the cultivation and utilisation of the ground-nut published in the “Bulletin of the Imperial Institute” (1925, 23, 291). In many cases, concrete floors are used on which to store the screened nuts, and in others grass or bamboo mats are used. As a result of these measures, the crop in 1924 showed a marked improvement over that of 1923, while the difference in price between Gambia and Senegal nuts has been decreased from 10s. to 5s. a ton. The percentage of foreign matter has been reduced to a negligible figure through the compulsory screening, and the average acidity of the oil has fallen to 1·2 per cent. The improvement in the quality shown by the 1924 crop was due partly to the fact that the plants were raised from seed carefully selected from the previous year’s crop, whilst the climatic conditions were particularly favourable. Trials made at the Agricultural Station with Senegal seed from Cayor showed that this seed was not so suitable as the Gambia seed, the yield per acre of the former being 1,120 lb. in comparison with 2,055 lb. for the latter. Nigerian and Philippine seed have both given good results when grown under Gambia conditions. In 1924, 60,622 tons of ground-nuts, valued at £861,925, were exported from Gambia.—From the Bulletin of the Imperial Institute.

WHAT IS CLEAN MILK ?

"Clean milk is produced, not by straining the dirt out of the milk, but by preventing it from getting in." This sentence summed up the lecture given by Miss Jackson, the dairy instructress for the county, on the occasion of a practical demonstration of the production of clean milk given under the auspices of the Herefordshire County (England) Agricultural Committee.

The cowman, who was dressed in white overalls, after quickly brushing the cow's flanks and washing her udder from one bucket, and then rinsing it with clean water from another bucket, proceeded to milk the cow into a pail especially designed for clean milk production, it having only a very small opening to prevent dust and impurities from falling into the milk. It was noticed that the man milked dry handed, and that he rejected the first squirt from each teat, the reason being that these contain a large number of bacteria which have found their way into the teat, not from the udder, but from the outside.

"It is important," said Miss Jackson, "that the milkers should be healthy and not come into contact with any person suffering from a contagious disease. They should wash their hands immediately before milking, and as often as may be needed besides, and their finger-nails should be kept short and clean. Care should also be taken not to place the head against the cow's side while milking, for by this means dirt or hair may be loosened and fall into the milk."

After the cow had been milked the milk was strained through a cotton wool disc, which was compared with one through which milk had been strained from a cow milked into an ordinary bucket by a man who had not washed the cow or taken any precautions to keep impurities from getting into the milk, and the company were astonished at the difference between the two discs, the one showing no sign of impurities, but the other showing an amount of hair and bits of straw and dirt.—"The Dairy."

WEEDS OF QUEENSLAND.

No. 42.

MILKY COTTON BUSH (*Asclepias curassavica*).

By C. T. WHITE, F.L.S., Government Botanist.

Description.—An erect glabrous herb with a single stem or few branches. Leaves opposite, lanceolate, 3 to 4 inches long, tapering at the base to a short stalk of about $\frac{1}{2}$ inch. Flowers about $1\frac{1}{2}$ inches diameter, on stalked umbels in the upper axils, often forming a rather large showy terminal inflorescence; sepals green, petals (corolla lobes) red, reflexed; staminal column in the centre of the flower capped by 5-lobed bright yellow corona. Seed-pods (follicles) 3 inches or more long and $\frac{1}{2}$ inch in diameter tapering very much at both ends, when ripe bursting along a central suture and letting free the plumose seeds. Seeds brown, capped by a tuft of white silky hairs.

Distribution.—A native of tropical America, now widely distributed as a weed in most warm countries.

Common Names.—Names by which this plant goes under in Queensland are "Milky Cotton Bush," "Milk Weed," "Wild Cotton," "Red Head," "Wall Flower Cotton Bush," and "Wild Oleander."

Botanical Name.—*Asclepias*, from the Greek Asklepios (Latin Aesculapius), the God of Medicine, evidently from some supposed medicinal properties of the earlier described members of the genus; *curassavica*, Latinised word meaning a native of Curacao, West Indies, from which place specimens were first described.

Poisonous Properties.—The plant has at numerous times been suspected of poisoning stock in Queensland, and several species of the genus in other parts of the world are known to be definitely poisonous.

I received recently from the Acting Director of the Australian Institute of Tropical Medicine, Townsville (Dr. A. H. Baldwin), three specimens of plants from Ayr with the report that these plants had been received at the Institute as the probable cause of losses among sheep. The three plants sent were *Solanum torvum* (Devil's Fig), *Trema aspera* (Poison Peach), and *Asclepias curassavica* (Milky Cotton Bush).

Later Dr. Baldwin wrote me as follows:—"We have carried out experiments on guinea pigs with portions of all the three plants, with the following results:—

"(a) Guinea pigs ate readily Nos. 2 and 3—i.e., *Solanum torvum* and *Trema aspera*," and suffered no apparent ill effects.



PLATE 26.—MILKY COTTON BUSH (*Asclepias curassavica*).

“(b) Guinea pigs were apparently reluctant to eat No. 1, *Asclepias curassavica*, but after twenty-four hours one pig was observed to eat a small quantity of the finely chopped leaves. This pig was found dead next morning. The post-mortem picture was as follows:—Eyes moderately dilated, some frothy fluid about the mouth. On opening the body a curious gelatinous oedema of the abdominal wall was noted. Some fluid (also gelatinous in the abdominal cavity). Liver pale; spleen normal; intestines moderately distended; suprarenals hemorrhagic; lungs very engorged.

“Another pig was placed in a cage and given some of the leaves. Two hours later symptoms developed as follows:—Weakness and staggering gait; intermittent convulsive shivering fits. Death ensued some hours later. On post-mortem the same picture as in the former case was noted in a lesser degree, save that there was no gelatinous oedema.

“The stomach and intestinal contents and urine of these pigs were tested for HCN and the common alkaloid, with negative results.

“It would therefore seem fairly conclusive that plant No. 1, *Asclepias curassavica*, was responsible for the death of these pigs. The symptoms and the post-mortem findings recorded from the affected sheep at Ayr were very similar to those noted by us in the case of the guinea pigs.

“We have not isolated a specific toxic agent which would probably be ‘Asclepiadin.’”

Other Properties.—In the “Queensland Agricultural Journal,” vol. 3, page 437 (December, 1898), F. M. Bailey had an article on this weed. Among other things he states—

“According to Don the juice of *A. curassavica*, made into syrup, is said to be a powerful anthelmintic. In the West Indies it is given to children for that purpose, from a teaspoonful to a tablespoonful. The juice and pounded plant are reputed to have the power of staunching blood. The root dried and reduced to powder is frequently used by the negroes as an emetic, and hence its name ‘Wild Ipecacuanha.’ Dymock says that Dr. Guimares described the physiological action of *A. curassavica*. He found it to act directly upon the organic muscular system, and especially upon the heart and blood vessels, causing great constriction of the latter and distention of the larger arteries. Secondly, it occasioned great dyspnoea (difficulty of breathing), vomiting, and diarrhoea.”

In the October (1897) number of the “Kew Bulletin” an account of this plant as an insectifuge is given. It states that it grows everywhere, as a weed, about the Isthmus of Tehautepec (Southern Mexico), and is used by the Indians there to keep away vermin, especially fleas. They make a broom of it, and sweep the floors and walls of their huts, and find that they are not troubled with fleas for a considerable time afterwards. They have also tried brushing dogs with it when their coats are full of vermin, and it appears to answer the same purpose with them. The Indian name of the plant is “Chilpati.”

Eradication.—It is usually nowhere so abundant that hand-pulling or hoe-cutting cannot cope with it.

Botanical Reference.—*Asclepias curassavica* Linnaeus. Species Plantarum I. 215, 1753.

RECENTLY DESCRIBED QUEENSLAND PLANTS.

In a recent paper read before the Royal Society of Queensland the Government Botanist, Mr. C. T. White, F.L.S., and the Assistant Government Botanist, Mr. W. D. Francis, described a number of new and little known Queensland plants. Two of these plants are shown in the accompanying illustrations, which are from the pen of the departmental illustrator, Mr. I. W. Helmsing. *Grevillea sessilis*, which belongs to the Silky Oak family, was collected at Torrens Creek, North Queensland, by Mr. J. E. Young, who later accompanied the Wilkins Expedition to North Australia. Mr. Young's specimens bore flowers. Many years before the late F. M. Bailey had collected fruiting specimens of the same species between Mantuan Downs and Springsure. The examination of Mr. Young's specimens showed that the species was undescribed.

Cassia neurophylla is a leguminous shrub only recently found in Queensland. It was collected in the sandstone ranges of Settlement Creek, in the Gulf Country, near the Queensland-Northern Territory border, by Mr. L. Brass. The Queensland specimens were described as a new species, but attention has been drawn to the fact that Mr. W. V. Fitzgerald found the same plant in the Kimberley district in the north-west of Western Australia and named it *C. neurophylla*. Strangely enough the same specific name was chosen for the plant by Messrs. White and Francis. Mr. Brass's specimens are illustrated in the accompanying plate.



PLATE 27.—GREVILLEA SESSILIS, *White and Francis*.

1, about one-half natural size; 2, flower $\times 2\frac{1}{2}$; 3, flower with perianth removed $\times 2\frac{1}{2}$; 4, anther inserted on perianth lobe; 5 and 6, fruit; 7, seed.



PLATE 28.—*CASSIA NEUROPHYLLA*, W. V. Fitzgerald.

1, about natural size; 2, petal $\times 4$; 3, sepals $\times 4$; 4, stamens $\times 4$; 5, ovary $\times 6$; 6, seed $\times 4$.

CREAMERY BUTTER MAKING—A GROWING DANGER.

By G. SUTHERLAND THOMSON, F.R.S. Edin., N.D.D., B.D.F.D.*

Permanency and success of the butter industry in every country will be found in the source of the milk and cream supply, and in transport and cold storage services. The source is the birthplace of the hereditary qualities which give the foundation to choice and health-giving elements in butter. It is natural, therefore, that the exponents of artificiality and expedients in the creamery will, at least, indirectly ignore the source of high-grade produce, and also overlook the necessity for reforms in the great auxiliaries—road and rail transport and cold storage.

Sound Development Based on Intelligent Study.

Before an industry can be developed along sound national lines, the dairy hereditary of each division of the country must be carefully examined and intelligently studied. Without this, injury, as seen to-day in some countries, will follow, and which is more intensified in an export butter trade. It may be stated that hereditary is the constitution of the milk and cream supply, and also of the butter. It is well known among graders and judges of the butter of different countries, that good and bad qualities are directly and indirectly associated with the climate, soil, and the food of cows. Butter from one division, or it may be from a whole country, is constitutionally weak; in other instances it is constitutionally strong. It follows that different treatment is required to get the highest results in the manufacture of the butter, keeping separately in view home consumption and an export trade.

Let us begin with a country productive of butter of insipid flavour and correspondingly weak in body. The creamery manager would be conscious of the fact that butter from such a country would not have an aroma, flavour, or texture characteristic of superfine produce, and its keeping properties would be secondary. What would the intelligent dairy expert do if he had the power? He would, first of all, turn to the raw milk and cream. He would take searching steps to remove the chief outside sources of injury. He would also make a special point of protecting the transport of the milk and cream by road and rail. What would he do in the creamery? He has overcome, shall we say, the terrors surrounding the raw material, which means that the milk and cream are free of irreparable injury. Would the expert attempt to ripen this cream to an advanced acidity, such as practised in Denmark, Holland, and other countries readily accessible to the British market?

Importance of a Pleasing Aroma in Butter.

Provided the butter was to be consumed soon after manufacture, he would pasteurise the cream and ripen thoroughly. With the general treatment of butter-making, however, one does not base instruction on storing the produce for unusually long periods, or in openly catering for speculation. But if the regular output of a creamery had to undergo storage, afterwards transported long journeys by steamer at uncertain and faulty temperatures, and to arrive on a market often necessitating further storage before going into consumption, a different policy would be necessary. And what might it be? The expert butter-maker would pasteurise to a maximum degree of heat, coming as near as it is safe to practical sterilisation, which would clean the cream of any possible hidden bacterial dangers, and give greater promise to the keeping qualities of the butter, including texture. Also the high pasteurising temperature would attack moulds and yeasts, which appear inseparable from cream in all countries. But before pasteurising, do you think the butter-maker would neutralise the cream? Provided the cream is pure and sweet, and has a texture consistent with a well-conducted industry, he would have no occasion to neutralise. And would he develop acidity after high pasteurising? Yes, he would; but with great care, one important reason being that prominent and skilled British buyers seldom taste the butter they handle; it is the breath of the butter they examine. The trained butter-maker knows that it is worth much to cultivate a choice lactic aroma at the bidding of commerce, and that indirectly all butter is made for the commercial man, whose influence, training, and business principles cannot be brushed to one side. When the buyer examines butter that is dead, it is on the aroma that condemnation rests. And he may be tempted to judge severely when good qualities in the butter are badly developed, and do not reflect on the aroma, which we know does happen. *Let it be repeated, give to your export butter a lactic breath that speaks of health and quality.* And as experience grows the butter-maker will realise more and more the necessity to treat aroma with increasing respect, and ever to remember

* In "The Dairy" (England) for May, 1926.

that it is distinct from taste, and far removed from smell and taint; and the same applies to flavour.

When pasteurising cream, the butter-maker will be well advised to take precautions that a pronounced scalded taste is not given to the butter. The lactic flavour of pasteurised cream will partly neutralise, so to speak, a scalded taste and give to the butter a pleasing aroma, with other distinct advantages to marketing. With a well-controlled acidity in the pasteurised cream, you have a pure and clean acid which is characteristic of superfine butter.

The Danger of "Fishiness" and Other Defects.

The butter-maker will have firmly planted in his mind that immediately the sweetness in cream is controlled by the acid—that is, the fine acidity has gone—the safety line is passed, and butter is brought within the dangerous influence of fishiness and other grave and costly defects.

It was the writer who first brought to light a primary cause of fishiness, and the advantages of controlling acidity in cream; and to follow is a brief extract of Part I. of the investigation he completed twenty-seven years ago, and which is taken from the "Queensland Agricultural Journal" for May, 1900. From this investigation much permanent good to butter-making in the British Empire has resulted. The writer may be considered negligent for not having more ardently followed up his success, but even as far back as the year 1900 there appeared obvious dangers which are now disclosed in this contribution, and grow more and more apparent:—

EXTRACT OF INVESTIGATION.

"The following table records the hours of ripening, also the flavour of the butter manufactured under the headings of 'Fishy' and 'Sweet':—

FISHY BUTTER.							
<i>Flavour.</i>							<i>Hours of Ripening.</i>
1. Very strong fishy	..	..	..	..	..	..	48
2. Strong fishy	..	..	..	..	..	..	72
3. Strong fishy	..	..	..	..	..	..	48
4. Strong fishy	..	..	..	..	..	..	24
5. Full fishy	..	..	..	..	..	..	60
6. Full fishy	..	..	..	..	..	..	30
7. Light fishy	..	..	..	..	..	..	53
8. Fishy	..	..	..	..	..	..	45
9. Strong fishy flavour	..	*	..	..	..	..	20
SWEET BUTTER.							
10. Good flavour	..	..	..	..	..	..	26
11. Sweet	..	..	..	..	..	..	28
12. Sweet	..	..	..	..	..	..	20
13. Sweet	..	..	..	..	..	..	14
*14. Sweet	..	..	..	..	..	..	Speedily churned
15. Sweet	..	..	..	..	..	..	Speedily churned
16. Good flavour	..	..	..	..	..	..	51
17. Good flavour	..	..	..	..	..	..	48

* This refers to sweet cream.

"From the above it will be observed that the fishy butters were manufactured from the old creams.

"No. 9 of the fishy lot show twenty hours for cream ripening, but this is accounted for owing to a starter having been added.

"No. 16 had the cream preserved in salt before churning, hence the delay of fifty-one hours in ripening, and No. 17 was pasteurised.

"An examination of the fishy butters for an alkaline and acid reaction showed that the sweet butter favoured the alkaline test, and with all the fishy samples taken strong acid reactions favoured. An acid flavour in the fishy butters prior to refrigeration was very evident."

The butter in this part of the South Australian investigation was winter made, and the hours given cannot be taken as a specific guide to cream ripening in export dairy countries. All the butter was cold-stored for seven weeks. Part II. of the investigation was devoted to fishiness and storage temperatures, and was completed in Queensland in 1902, with very valuable results.

It is shown in the above extract that over-acidity is a bad mistake when butter has to be transported long distances and cold-stored for extended periods. In Britain, for example, great damage is done to the quality of butter owing to the average acidity of the cream being excessive. This follows a system of collecting small quantities of cream in the same vessel and churning on definite days of the week. Were it possible for British-made butter to be manufactured from cream showing a milder and better controlled acidity, an improved quality would be immediate. It is also known that Danish butter and Dutch butter, which is made for quick sale in Britain, does not store well, and a striking illustration may be given. Danish butter competed in an international butter test which was organised in New Zealand, and the award of the judges bore striking evidence in support of a lower acidity, Danish butter having to take a subordinate place in the list of awards.

Queensland Butter a Revelation—Awarded Premier Honours.

A much more exhaustive test was organised later . . . and the unanimous opinion of a large body of eminently practical judges gave the premier honour to butter from Queensland. In this test the butter of many nations passed through the most searching of trials, and the remarkably fine quality of the Queensland butter was a revelation to all the experts. Neutralised butter was included in the exhibits and proved a bitter disappointment.

Neutralising a Difficult Expedient.

Let it be said that neutralising is a difficult and uncertain expedient. The cream of certain dairy divisions or districts, for example, may have a hereditary slowness in developing acid. When this class of cream is neutralised with soda, and the butter shipped from a distant country to England, the taste of the soda will be found pronounced, everything else being dead. One might say that the nutrient had destroyed the weak life of this class of cream. Neutralising should apply to faulty supplies of cream only—that is, when acidity has passed the danger line. The creamery manager should not be encouraged by any class, including merchants, to think that first-grade butter can be made from second-grade cream.

It cannot be too often stated that artificial practices of treating cream should not be adopted before every effort is exhausted in the natural development of the butter industry. An overdose of lactic acid in butter will always be preferred by the British consumer to an overdose of soda, and as years advance the feeling against chemicals will increase.

Cold, the Finest Preservative.

Had some expedients never been introduced, the butter industry of the world would be more advanced than it is to-day. There would be, without doubt, a sounder milk and cream supply, better transport, and a decidedly better cold storage and distribution service. Cold, the finest preservative of all, largely governs the milk and cream supply, and also butter, and, in addition, it has a powerful influence for good on distribution. Cold has been tragically neglected, chiefly on account of obedience to policies and practices which mask the worst defects in the raw and manufactured produce.

The writer conclusively proved in 1901-2 that staleness and other taints common to neglected cream continue to grow in butter at cold storage temperatures which are regarded at present as perfectly safe for the preservation of butter for long periods. An extract of the writer's investigation, which was published by the Government of Queensland in 1902, is as follows:—

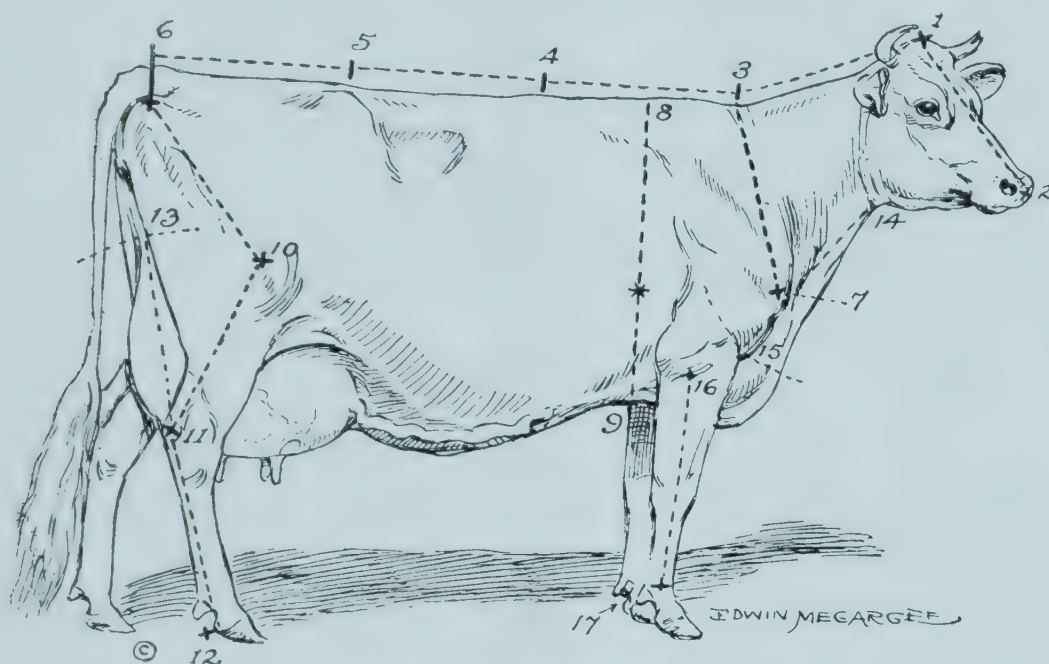
“The striking features were the pronounced stale and rancid flavours in butter which were kept at a temperature from 25 to 32 deg. F., and the consistent weakening of the flavour at temperatures of 18 and 12 deg. with its entire absence at a temperature of 5 deg. F., in the case of butters which were not affected with these flavours at the commencement of refrigeration. Boxes of butter which were either slightly ‘off’ or distinctly ‘off’ in flavour when refrigeration began, did not develop a stronger flavour at 5 deg. F., or, in other words, the affected butter practically came out of the chamber (5 deg. F.) in the same condition as it went in. Of the forty-four boxes tested before refrigeration, stale flavours were found in sixteen boxes. After refrigeration at temperatures from 25 to 32 deg. F., forty-two were found affected, the flavour having greatly increased.”

The obsession of every creamery manager and butter-maker should be low temperatures in the preservation of the raw and manufactured produce, pasteurisation and carefully controlled acidity, and to treat chemicals with the feeling of one who is afraid to begin lest he be unable to stop.

THE IDEAL DAIRY COW.

The well-known animal painter, S. Edwin Megargee, and Gozo Kawamura, sculptor of animals, were commissioned by the True Type Committee of the Holstein Friesian Association of America to make a study of the best cows of the breed and to make therefrom a painting and statue of the ideal Holstein cow. They worked in conjunction with such competent judges as W. S. Moscrip and R. E. Haeger, and made exact measurements with calipers and tape of more than a thousand cows.

These measurements bore out to a certainty what both men had believed for a long time, viz., that all great cows when measured show an invariable mathematical proportion, and that by a series of simple measurements any one may determine to what degree any particular cow measures up to this standard of perfection. It was found also that great producing cows measure up to this standard. Indeed, there was demonstrated an almost absolute correlation between type and production.



By courtesy of the "Live Stock Bulletin."]

PLATE 29.—(Diagram A) SHOWING METHOD OF APPLYING THE NEW SYSTEM OF MEASUREMENTS.

Score cards are composed of such vague generalities that no painter, let alone a sculptor, could fashion a painting or statue from them. A cow should have a deep heart girth. How deep? A long body. How long? Wide hips. How wide? A high rear udder attachment. How high? Just how thick in the middle is a cow with well sprung ribs? Mr. Kawamura, with nothing but two hands and some clay realised that it was necessary for him to obtain accurate three dimensional measurements before he could proceed to make a statue.

These measurements were likewise important to Mr. Megargee, the painter, and so the two men set about obtaining them. Their first step was to consult expert breeders and judges. It was thereupon discovered that there existed among these experts differences in opinion as to the relative merits of different animals. After much travail these warring ideals were reconciled, and Messrs. Kawamura and Megargee proceeded with tape measure and calipers to measure a thousand individual specimens, every one of which was strong in at least one point and sometimes in many. The purpose was to obtain the correct measurements from which to make a composite animal, which should combine the best features of many other animals, blended into a harmonious whole with fixed dimensions and representing the consensus of the most expert judges. Messrs. Megargee and Kawamura have been using for years in their work a certain system of measurement and proportion, and they discovered that their methods were practically identical. In the many herds which they had visited and in the show ring where they stood with judges, and in the countless individual animals they had examined, they found a certain definite proportion of one part to another, and the more measurements that they made the more they were convinced that there existed a fixed system in the structure of a good cow, and that the nearer the cow approached this system by actual measurement

the better cow she was. The presentation of this system of measurement and proportion, which is herewith given, sheds light for the first time on a much disputed problem. It is believed by the originators of this system that it will show up the faults of any cow to which it is applied. It will also show to a large extent how close to perfection a cow approaches and in what respects she achieves perfection.

Standards of perfection have been used for many years in breeding domestic animals. There are accurate standards for the different breeds of poultry and for many breeds of dogs. Greek sculpture defined perfection in the human female form in the statue of Venus de Medici, which is used to this day as the standard of perfection in beauty contests. No one will deny the value to the dairy cattle industry of establishing an ideal type of dairy cow. This type will be both an example and an inspiration, but unless it is correctly done it will defeat the very purpose for which it was constructed. It will have an invaluable beneficial effect upon the work of our judges, and by establishing an exact standard will serve to eliminate the kickings and jealousies which, alas, only too frequently are engendered by faulty judging and favouritism.



By courtesy of the "Live Stock Bulletin."]

PLATE 30.

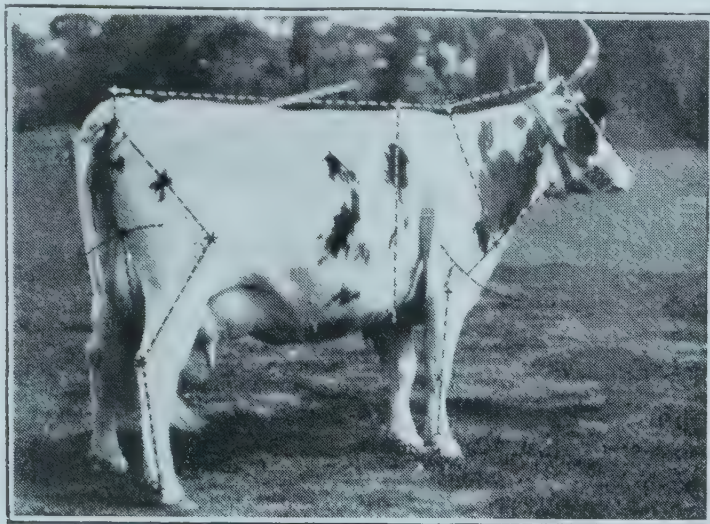
(Diagram B.) SHOWING MEASUREMENT FROM SHOULDER POINT TO SHOULDER POINT.

(Diagram C.) SHOWING MEASUREMENT FROM HIP TO HIP.

In addressing the Western Pennsylvania Guernsey Breeders' Association recently, Mr. Megargee gave the following description of measurement and proportion with the accompanying diagrams and photograph.

"In this system the unit of measurement is the head, from the poll to the flat of the muzzle, as numbered on the chart 1 to 2. Following the chart it will then be found that from the joint of the withers and the neck (3) to the pin bone is three head lengths, being divided as follows: Withers to middle of chine (3 to 4) one head length, chine to hip (4 to 5) one head length, and hip to pin bone (5 to 6) a head. Now from the withers to the point of the shoulder (3 to 7) is also a head length, and through the heart (8 to 9) the depth should be a head and a-half. This measurement varies slightly, but I regard the head and a-half as ideal. From the pin bone to the gambrel (6 to 10) is a head, from the gambrel to the hock (10 to 11) a head; and from the hock to the heel (11 to 12) a head. If one swings an arc with the hock as a pivot, with a radius of one head, it will cut across and mark the proper spot from the rear udder attachment at the point marked 13. Similarly, an arc from the junction of jaw and neck (14) with the same radius will give the spot where the upper arm joins the shoulder. From the poll to the withers should also be a head, but this varies greatly with the varying carriage of head, so that one should be careful to make the measurement only when the head is carried at the normal angle as shown in the illustration. From the upper arm, as indicated at 16, to the pastern joint (17) should be a head, but this does vary, and many excellent individuals do not conform to this. Nevertheless, I regard it as the ideal length of foreleg.

“The one measurement that hardly ever varies, even in the poorest animals, is from the hock to the heel. This is practically always exactly a head. So true is this that this measurement serves as a means of checking up on all the others. For instance, one occasionally meets with an animal that seems all wrong when measured by heads—every measurement seems too large. If it is found that the hock to heel and the head do not agree, try using the former as the standard and it may be found that the animal is correct everywhere in body but is small in head. In diagram B is



By courtesy of the "Live Stock Bulletin."

PLATE 31 (Diagram D.).

BLANCHE OF LONGLANDS, CHAMPION AYRSHIRE OF QUEENSLAND, IS ALMOST IDEALLY PROPORTIONED.

shown that from point of shoulder to point of shoulder is one head. Also in C that from hip to hip should be at least one head; if this measurement goes over a head so much the better.

“Good dairy cows are much the same, structurally. Breed differences are in the head, udder, thurl, and other minor points.”

Messrs. Megargee and Kawamura plan to publish a booklet telling in greater detail of this system.”—By Harold G. Gulliver, in “Country Life.”

FALLOWING—THE MAIN PRINCIPLES.

In exactly what degree the increasing popularity of fallowing for wheat is attributable to the fallowing and crop competition movement it would be difficult to say, but that much of the credit is due to the inauguration of the contests is undeniable. Nor, it would seem, is only more land being fallowed—the fallowing is of an improved standard. In this connection it is interesting to note in a review in the current “Agricultural Gazette” of New South Wales, of the fallowing competitions of the season 1925-26, the following comment by the Senior Agricultural Instructor in the Western District (Parkes Centre):—

“The judging of a fallow competition to-day is a more difficult matter than it was three years ago, when usually the three leading fallows could readily be separated from the rest. Little faults that were hardly worthy of notice then have now become matters of considerable importance as a means of picking the winners. This indicates a higher average standard of work. Fallows are now worked more frequently, and where five workings used to be about the maximum, eight are now given. The average number of workings up till judging time which the ten fallows in the Parkes competition received in 1924 (including the ploughing) was 4.9, while the nineteen fallows competing in 1926 received 5.63.”

For the guidance of those interested in the improvement of their methods, the following further extract is taken from the report of the Agricultural Instructor who acted as judge in the Cumnock competition:—

“While, owing to the great variation in types of soil met with in any given district on the western slopes, it is not possible to lay down any hard and fast rules for working the soil, it is undoubtedly a fact that if certain methods, with modifications to suit the individual soils, are adopted, satisfactory results can confidently be expected.

The First Essential.

“The first essential perhaps is the conservation of moisture in the soil during the ten to fourteen months prior to sowing the crop, therefore the earlier the preparation of the soil the better in most cases. If the ground is known to be dirty with wild oats, thistles, &c., a spring-tooth cultivation or discing the previous autumn is recommended. This ensures that with the advent of suitable rains there will be an early germination of weeds, which can easily be kept in check by sheep until after seeding operations are completed, when the land should be ploughed as soon as possible to an even depth, which on most classes of soil need not be more than 4 in. It is also advisable to turn under as much green growth and straw as possible, as this will augment the humus content of the soil, which is essential to a good tilth, and to the maximum activity of useful bacteria in the soil. It is very important to create as suitable conditions of moisture and soil temperature as possible for these soil bacteria, as upon their activity depends the availability of plant-food under the chemical processes of oxidation and nitrification.

Other Factors.

“While bearing these factors in mind, the farmer must not lose sight of other essential factors in the preparation of an ideal seed-bed, namely, the compactness or consolidation of the surface soil or of that layer of soil between the surface mulch and the original ploughing depth. The control of weed growth during the summer must receive attention, and also the prevention of loss of moisture by means of a suitable mulch. If the ground is known to be dirty an early harrowing is advisable to break down the plough furrows and to fine the soil, in order to induce the maximum germination of weed seeds. With reasonably clean ground, however, the first operation after ploughing should be a cultivation with a tine implement down to the full ploughing depth, in order to bring many clods (dry and otherwise), which have been ploughed under, to the surface, thus avoiding air pockets, which prevent consolidation and allow too great an aeration of the soil. During this cultivation the finer particles of soil are sifted down to fill up the spaces originally occupied by the aforementioned clods, and from that time forward compacting of the soil will be gradually brought about by the subsequent necessary cultivation, by the use of sheep, and by the rains which may fall on the fallow. This cultivation should be done before haymaking operations commence.

Subsequent Cultivations.

“Thereafter all subsequent cultivations should be carried out after any and every serviceable fall of rain, with the object of keeping a loose mulch surface, and to prevent moisture evaporating and the growth of weeds. The best implements to use are the harrows or tine implements, such as the springtooth, scarifier, &c. The various disc implements are often used, generally to deal with weed growth which has got out of hand, but these should be avoided as much as possible, as they tend to spoil the fallow, especially if used in the autumn, firstly by going too deep and affecting the consolidation, and secondly by fining the surface soil, so that it then has a tendency to run together and set hard after rain. An effective mulch need not be deeper than from 2 to 2½ in.

“It is quite recognised that when weeds, such as black thistles, saffron thistle, Mexican poppy, wild oats, &c., get out of hand, the only implements that will deal effectively with them are of the disc or skim plough types, but a cultivation at the right time, before the weeds make too much growth, and the judicious use of sheep by the farmer, can largely prevent this.”

Seven Main Factors.

The main factors in the production of a good fallow are enumerated by the writer as follows:—

- (1) Early ploughing or cultivation of the land to conserve moisture and rid the soil of weed and fungus pests.
- (2) A deep primary cultivation in the spring to bring all clods to the surface, thus aiding consolidation.
- (3) The judicious working of the fallow when necessary, which, combined with the aid of sheep, will help to produce the ideal seed-bed.
- (4) The avoidance of the use of disc implements where practicable.
- (5) The obtaining of a shallow mulch with a nicely clodded surface, which will prevent evaporation of moisture, erosion and washing of soil, and the crusting of the surface.

SOUTHERN BANANA PACKING TEST.

The Director of Fruit Culture (Mr. A. H. Benson) has received the following report from Mr. W. Ellison, junr., Instructor in Fruit Culture:—

The packs reported on were:—

- (1) Single Banana Pack.
- (2) Full hand (Up and Down Pack).
- (3) Four Pack.
- (4) The Ellison Pack.

A test was initiated on Mr. A. E. Gordon's plantation, at Wamuran, on the 14th June, with fruit supplied by that grower. Weather conditions when the fruit was cut—dull, cloudy, and humid.

The fruit was well developed, and was conveyed from the plantation to packing-shed by horse and sledge.

The shed in which bunches were placed, and afterwards dehanded and packed, was open at the front only, with galvanised roof.

The bunches were dehanded three and a-half hours after being cut from the plant.

The hands were kept twenty-one and a-half hours, prior to packing, thus allowing twenty-five hours' shrinkage from time of cutting from plant to packing.

The hands during the night of the 14th June, were covered with corn sacks.

The weather conditions during the shrinkage and packing period were dull, humid, and chilly at night.

The separate details of each case was as follows:—Each case being branded with the following recognition numbers—Silk Bros., Sydney, C.O.D., and Silk Bros., Melbourne, C.O.D.

SYDNEY.

- Case.
- No. 1—Single Pack, 29.10 dozen. Packed by Mr. A. E. Gordon.
- No. 2—Ellison Pack, 28.2 dozen. Packed by W. Ellison, junr.
- No. 8—Ellison Pack, 31.10 dozen. Packed by W. Ellison, junr.
- No. 3—Full Hand Pack (Up and Down), 25.3 dozen. Packed by Mr. A. E. Gordon.

MELBOURNE.

- Case.
- No. 4—Four Pack, 31.1 dozen. Packed by Mr. A. E. Gordon.
- No. 5—Ellison Pack, 30.10 dozen. Packed by W. Ellison, junr.
- No. 6—Full Hand (Up and Down), 26.1 dozen. Packed by Mr. A. E. Gordon.
- No. 7—Ellison Pack, 29.1 dozen. Packed by W. Ellison, junr.

The Ellison was made up as follows:—

	No. 2.	No. 8.	No. 5.	No. 7.
	Dozen.	Dozen.	Dozen.	Dozen.
Full Hand	.. 19.2	.. 23.6	.. 19.11	.. 19.7
Sixes	.. 2.0	.. 2.0	.. 2.0	.. 2.6
Fours	.. 3.8	.. 3.6	.. 2.8	.. 3.4
Twos	.. 1.6	.. 1.0	.. 3.4	.. 1.8
Singles	.. 1.10	.. 1.10	.. 2.11	.. 2.0
	28.2	31.10	30.10	29.1

The cases, which were of dried pine, in all instances were lined with double newspaper. The fruit after being packed was conveyed to Wamuran Station by motor lorry on Wednesday, 16th June, and cleared from that station on Thursday, 17th June; cleared in Wallangarra on Saturday, 19th June. On Saturday, 19th June, Mr. Gordon and I left Brisbane on the Sydney Mail, arriving Sydney at noon on Sunday. On Monday, 21st June, at 10 a.m.; with Mr. Gordon and Mr. Chinn (Sydney representative of C.O.D.), I visited Messrs. Silk Bros.' store and inspected the Sydney consignment, which had then arrived. The "single" and the "Ellison" pack being opened showed tightness, but the "full hand" (up and down) showed slackness. Cases were again renailed and placed in Mr. I. Silk's charge, with instructions to place them in the ripening chamber, and have them, if possible, ripe

on our return from Melbourne on the 28th June. On the afternoon of the 21st and all day on the 22nd June, I visited different banana agents, who opened various consignments for my inspection. I saw bananas from the North Coast, South Coast, New South Wales, Northern Queensland, and also from Fiji. The fruit was in all stages—from green (prior to going into ripening chamber) to coloured. There was no uniformity in the packing; the majority, however, being in "singles." "Black-ends" were very pronounced in many instances when leaving the ripening room on fruit that had been broken (during dissection of bananas after dehanding but prior to packing). Where fruit had been cut with knife, leaving sufficient stem on the shank, "black-ends" did not show. The colour of the ripe fruit varied. This, in my opinion, being to a large extent due to the period allowed fruit remaining on the bunch prior to being dehanded. I questioned different agents on this matter of colour, and they stated that same brands varied in different weeks, but the variation of colour was more pronounced in summer than in winter; this however, is no doubt due to more sap in the summer than in the winter. Many brands opened up beautiful in colour and appearance. There was no attempt in very many instances to follow grading regulations. Cases marked "Special" and "Choice" contained bananas $5\frac{1}{2}$ and $4\frac{1}{2}$ in. respectively. The Fijian bananas were packed in "fours," "sixes," and also "singles." The "single" banana showing "black-end" very badly, also slightly on the "four" and "sixes." All the Fijian fruit had been broken and not cut prior to packing. The length of the fruit also varied considerably—from 4 to 8 in. being the length of fruit seen in a case closely inspected. The fruit, while well matured, showed signs of rust, and in the same case were overripe, ripe, coloured, and hard green fruit.

On the night of the 22nd June we left Sydney for Melbourne. On the afternoon of the 23rd, all day on the 24th, and the morning of the 25th, I visited different banana agents and examined 250 cases of bananas at their establishments. The packs varied from "singles" to "full hand," the same conditions, as regards broken fruit, were noticeable here as in Sydney, showing the same defects. The Melbourne agents were unanimous in their opinion and in favour of all bananas being cut and not broken prior to packing. On the morning of the 25th, in company with Professor Goddard, I visited a number of agents' ripening rooms and sections, and we noticed irregular grading and immatured fruit being marketed by Queensland growers. The test packs which had arrived at Messrs. Silk Bros.'s section, were inspected by Professor Goddard and myself. At 2.30 p.m. on the 25th ultimo, a meeting had been arranged by Mr. Fisher (Melbourne representative of C.O.D.). Mr. Davis, chairman of the Agents' Association, presided. There were thirty-one other banana agents; Mr. Gordon and myself in attendance. Mr. Fisher was also present. We stated that the object of the visit and test was to endeavour to obtain a standard pack agreeable to all parties, but pointed out that no finality could be reached until the full report and scientific investigations of Professor Goddard were given regarding "squirter," as the particular packs might have some bearing upon this trouble. Professor Goddard was unable to be present at that meeting, owing to the necessity of his returning to Queensland that afternoon. The packs were then opened and examined. No. 6 pack, "Full Hand" (Up and Down), opened up very slack, and was not considered by the agents to be a suitable pack. Cases No. 4, 5, and 7 packs, opened up very tight and showed no shrinkage. In the course of the discussion the agents stated that the buyer bought on appearance and quantity. The chairman then asked if the agents approved of a standard pack for bananas. On a vote being taken, a standard was approved of unanimously. The agents were then asked to vote upon the standard pack they preferred. They favoured unanimously the "four" pack—the "Ellison" pack being second choice. The "full hand" (Up and Down) and "single" packs did not meet with their favour. Upon my request, the chairman then took a vote upon the style of "four" pack required, and it was unanimously agreed that a double finger (two over two) "four" pack on the cross be adopted. The reasons stated for this decision were:—

- (1) More bananas to the case.
- (2) Visibility of contents.
- (3) Admitted bananas ripened up better in full hands, but if any ripe fingers on hands upon arrival harder to replace than on a four pack.
- (4) Fours looked tighter and better appearance for buyers.
- (5) Less case marks on fruit. Some growers—who had packed the Ellison pack and full hand pack (Up and Down), their fruit showed more case marks than the four pack.
- (6) Those packing fours arrived tighter than other growers, who had been attempting the Ellison pack.
- (7) It did not comply with the Victorian Fruit Topping Act.

- (8) Mixed grades, small fruit packed in centre and wing fingers not being cut off in many instances.
- (9) Ninety per cent. of the fruit arriving on this market were not equal in pack to the test cases, or quality and grading of the Ellison and four pack exhibited. The agents admitted both were expert packing, and growers do not pack the Ellison pack as presented them in test cases, this either being for want of instruction or carelessness.

We left Melbourne on 26th June for Sydney. On the following Monday we attended a meeting of banana agents. Mr. Chinn (Sydney representative, C.O.D.) presided. There were present twelve of the principal agents of Sydney. After considerable discussion a unanimous vote was carried in favour of the standard pack, the test packs being opened. Cases branded Nos. 2 and 8 (Ellison pack) opened up tight and showed practically no shrinkage. No. 1 "single" pack opened slack, showing heavy shrinkage. No 3, "full hand" (up and down) was very slack, and was eliminated from the test by the agents. In cases Nos. 1, 2, and 8, the fruit in all instances opened up in a firm, ripe condition, and showed no waste, being a deep rich yellow colour. The agents then voted for the class of pack they wished standardised—voting, eleven for "single" pack and one for the "Ellison" pack. They were then told that the Melbourne agents had voted in favour of the "four" pack, and another motion was then moved, "That as the Melbourne agents had accepted the 'four' pack, they, the Sydney agents, were agreeable to accept it also in place of the 'single' pack," this being carried unanimously.

The reasons stated by the Sydney agents were somewhat similar to those set out by the Melbourne agents. They also stated that cases that had been arriving in the Ellison pack had been readily bought by shopkeepers to display the fruit for window show. Two agents in particular stated if the Ellison pack would minimise or eliminate "squirter," then they would be in favour of its adoption as a standard pack. I explained that nothing would be definitely decided until Professor Goddard's scientific tests had been finalised *re* "squirter." The agents congratulated me upon the pack. I agreed to carry out tests of any reasonable description for the agents as regards shrinkage, &c., or any other matter that affected the marketing of bananas which ultimately might be of benefit to growers.

Comments.

The following comments are in reply to the agents' reasons for asking for the "four" pack:—

(1) Regarding wanting the quantity to the case, the test carried out proved that there is very little difference, but to get fruit to arrive at its destination tight and eliminate defects, such as "wet end," "black end," and "squirter," came before quantity (dozens to the case).

(2) No pack will give complete visibility of the whole contents of a case of bananas; further, if packed on the cross pack, the spiking bananas used in the centre (if any required) do not show when the side is taken off the case for inspection.

(3) If growers will follow advice regarding cutting each ridge of bananas according to its merits of maturity on cutting days, and give the necessary period for shrinkage to notice fruit showing signs of springing, this trouble will be minimised. But if the centre-spiked bananas on the cross pack arrive ripe it will require the one half of the case to be pulled out to replace bananas in centre.

(4) The appearance may look better and fuller, but it is what the buyers are educated to see by efficiency of any pack that counts.

(5) Less case marks.—All packs show case marks, but each pack marks the fruit differently; further, the shrinking of fruit prior to packing again applies in this instance and will minimise the complaint.

(6) *Re* four arriving tighter than the "Ellison" pack. In some instances this is so, but if growers were given instruction and demonstrations and had been packing this pack for the same period as other packs there would be much improvement.

(7) Non-complying with Fruit Topping Act—Interstate. I visited the Chief Inspector of the Department of Agriculture, New South Wales, and was informed visibility had nothing to do with the Regulation, also the Ellison pack complied with the Regulation as much as the four cross pack. The Act states, "All contents of the case shall comply with the grade regulations laid down for that particular fruit and grade."

(8) Inclusion of small fruit.—This applies to any pack with respect to small fruit being placed in a case, particularly where spiked bananas are used to fill up the centre of a case on the cross pack.

Should a "four" pack be adopted, the question arises—Can it be made a uniform pack?—because, should fruit be over a certain length, it will not pack two sections across the case, which necessitates its having to be packed across and lengthways with the case. Therefore, the question of visibility arises here again. I am convinced, as far as a pack is concerned, that the "four" pack will suit the buyer, but the "Ellison," if properly packed, will suit both buyer and grower and minimise many defects; also, assist and make it easier for growers to grade better. The admission of the Sydney agents that this pack in certain instances was bought readily for window display of bananas proves that they arrive and ripen to the best advantage. Further, it will be of benefit to the grower by facilitating handling and packing, and it can be made a standard pack uniform fifty-two weeks in the year, irrespective of size of the fruit. However, I consider it unwise to recommend a standard pack at the present time, for, until Professor Goddard has completed his scientific tests in respect to "squirter," we have nothing concrete to work upon. When it has been decided to proclaim a standard pack it will be necessary to ask the Department of Agriculture of New South Wales to also adopt the standard pack.

EGG-LAYING COMPETITION.

MOUNT GRAVATT.

This competition commenced on 10th April. There are 192 White Leghorns and 6 Brown Leghorns in Section 1; Section 2 has 120 Black Orpingtons, 6 Silver Wyandottes, and 6 Langshans.

Following are individual scores averaging 16.9 per bird for the month:—

SECTION 1.

White Leghorns (except where stated).

Competitor.	A.	B.	C.	D.	E.	F.	Total.
E. V. Stuckey	62	60	59	55	61	54	351
P. U. Gooch	39	57	66	57	57	60	336
G. Pitt	60	63	59	55	43	54	334
S. L. Grenier	54	61	56	58	58	45	332
W. and G. W. Hindes	54	56	44	45	54	64	314
Mrs. L. F. Anderson	56	58	57	44	30	66	311
G. Brash	50	48	57	60	56	36	307
J. J. McLachlan	40	62	63	34	59	48	306
G. W. Cox	67	38	44	51	58	42	300
Mrs. R. E. Hodge	53	55	49	30	44	62	293
R. C. J. Turner	43	58	46	50	42	53	292
J. Harrington	57	52	40	63	32	47	291
Sunrise Poultry Farm	55	53	34	39	56	54	291
M. F. Newbury	61	21	59	55	55	35	286
G. Hanlon	52	46	57	35	36	56	282
J. E. G. Purnell	34	50	34	55	47	60	280
E. W. Ward	56	62	46	27	27	54	272
J. Earl	39	27	58	44	57	41	266
H. Fraser	58	4	38	57	34	64	255
J. Franklin	15	56	23	46	54	54	248
A. W. McMurtrie	36	60	59	38	15	24	232
Geo. Marks	28	40	29	45	60	27	229
B. Driver	50	48	44	40	18	23	223
H. Cutcliffe (Brown Leghorn)	13	62	50	33	12	41	211
W. Wakefield	61	2	25	29	54	30	201
W. E. Woodward	54	35	16	41	18	32	196
W. J. Boston	18	53	5	50	61	0	187
A. S. Walters	52	1	24	3	59	34	173
J. Columbine	12	33	34	34	34	6	153
M. F. Marsden	5	5	28	46	15	39	138
T. H. Craig	46	7	32	18	0	21	124
H. P. Clarke	6	74	2	9	12	26	109
R. M. Moore	3	0	11	40	2	30	86

SECTION 2.

Black Orpingtons (except where stated).

Competitor.	A.	B.	C.	D.	E.	F.	Total.
W. H. West	59	60	64	48	56	67	354
E. Walters	68	57	66	62	58	30	341
Eclipse Poultry Farm	45	59	62	50	73	36	325
J. Columbine	42	56	51	64	57	55	325
J. J. McLachlan	35	56	47	53	50	48	289
W. and G. W. Hindes	53	49	43	62	48	31	286
J. Potter	58	29	45	68	32	45	277
P. U. Gooch	51	65	50	28	42	39	275
E. W. Ward	56	52	33	34	46	50	271
W. J. Smith	56	50	39	40	33	43	261
R. Burns	36	47	52	31	54	36	256
Mrs. Potter	47	67	31	41	51	8	253
J. Hutton	62	30	54	19	30	58	253
W. T. Jones	59	50	33	9	29	67	247
G. Rodgers	22	42	24	43	63	44	238
W. R. Wilson	63	70	37	30	9	28	237
W. D. Melrose	23	26	15	33	65	52	214
E. C. Stead (Silver Wyandottes) ..	35	35	22	37	54	51	214
H. Cutcliffe	48	39	24	3	55	23	192
Mrs. A. E. Gallagher	37	57	26	36	30	0	186
E. A. Smith	30	25	22	16	26	22	141
Thomas and Shaw (Langshans) ..	45	4	5	3	28	28	113

THE STORAGE OF EGGS.

Compiled by P. RUMBALL, Poultry Instructor.

On the commercial scale eggs are preserved almost universally by means of cold air storage. For the small producer or consumer such a procedure is generally impracticable, and resort has been made to simpler methods, such as packing the eggs in sand, bran, ashes, salt, lime, &c. These methods have, however, now been abandoned in favour of storage in solutions in which the eggs are immersed and held until consumed or sold, states the Department of Scientific and Industrial Research, London, in a report on the "Storage of Eggs," a copy of which has been received by the Department of Markets and Migration. This report, which deals most exhaustively with all phases of the subject, may be obtained directly from H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, or from Messrs. Gordon and Gotch, Limited, Little Collins street, Melbourne. The price is 1s. 3d.

Continuing, the report states that the choice of a suitable solution is determined by certain considerations. The shell of the egg and its adjoining membranes are permeable to water and certain dissolved substances, and care must be taken that the preserving solution does not contain any ingredient likely to pass into the egg, thereby affecting its flavour or contaminating it in some way. Various substances have been tried and discarded for different reasons, so that at the present the two solutions most commonly used are a solution of sodium silicate, better known as water glass, and lime water, to which salt is usually added.

Fundamentally the preservation is still one requiring a certain degree of cold, and although for satisfactory results constancy of temperature is not required, it is essential that the eggs should be stored in a cool place where, if possible, the temperature should always lie in the range of 33 deg. to 45 deg. Fahr.

From their investigations the Board of Agriculture and Fisheries recommend the following specific solutions:—

- (a) Water Glass.—A strong solution containing approximately equal parts by weight of sodium silicate and water is sold commercially. It is very viscous and has a specific gravity of 1.7. A 5 per cent. solution of this is a convenient concentration to use.
- (b) Lime Water.—Four parts of finely slaked lime are mixed with twenty parts of cold water, and the whole well stirred for several days to ensure saturation. One part of salt is then added and the clear solution decanted and poured over the eggs which should be placed in suitable wooden, cement, or galvanised iron containers.

If the containers are open to the atmosphere the carbon dioxide in the air reacts with the solutions, giving a white precipitate. In the case of lime water it is simply a precipitate of calcium carbonate, whereas with the water glass silica itself is precipitated, due to the neutralisation of the alkali. It is therefore advisable, in order to maintain the solutions at the required strength, to cover the containers and so limit the ingress of carbon dioxide. An alternative method is to cover the liquid surface with a layer of oil, such as liquid paraffin or olive oil.

In both cases the eggs to be preserved should be clean and new-laid, and should not at any time have been subjected to a temperature much higher than 60 deg. It is therefore advisable to candle the eggs and discard cracked ones or any departing from this standard of freshness. Most investigators claim that water glass is the more satisfactory solution. Using the solutions described above, and, in addition, storing the eggs at a temperature of 32 deg. to 35 deg. Fahr., eggs have been preserved in the course of experiments by the Department for twelve months in both solutions with good results. The taste of the eggs stored in water glass was excellent, the air chamber was the same size as before storage, and the white had all the consistency of a new-laid egg. The eggs fried and poached, but nearly always cracked on boiling unless the shell was first pierced at the broad end. The only other point was that the shells had a slight crusty deposit which was not removed on washing with water.

The eggs stored in lime water were not so good, although the flavour was excellent. In all cases the air chamber had completely disappeared and the white was more fluid and tended to spread when the contents of the egg were emptied into a dish. The shell in every case was markedly thinner and appeared rough and amorphous. In general, the shell cracked on boiling, even though it was first pierced. Presumably, the action of the lime water was to make it very brittle.

The role played by the water glass in preserving the eggs is very simple. Being a colloid it does not pass through the egg membrane, and, indeed, Hendrick has shown that the silica content of eggs is not increased after two years' immersion in water glass. Further, Berger has shown that within three to seven days the water glass is deposited in the pores of the shell, completely sealing it. This, of course, is the reason why the shell has to be pierced prior to boiling. Once the egg is sealed it suffers no change resulting from external causes such as mould or bacterial invasion.

Commercial water glass is very alkaline, and some controversy has taken place as to whether a neutral sodium silicate would give better results. A certain amount of alkali is necessary to dissolve the silica, but it is claimed that the excess alkali affects the flavour of the egg. This fear, however, appears to be groundless in view of the fact that with water glass the egg is so quickly sealed. It is possible, however, that the alkali concentration influences the extent of the action of the water glass on the shell surface.

With lime water it would appear that the egg is never completely sealed, and therefore permits the passage of water through the shell, which fills the air chamber. This is rather striking, in that the solution in the present experiments (containing 5 per cent. sodium chloride) had a much lower freezing point, and, therefore, greater osmotic pressure than the white of the egg. The solubility of lime in water is small (approximately 1 in 700), and the freezing point of the lime solution will, therefore, be very approximately that of a 5 per cent. salt solution, *i.e.*, 3 deg. C. One would therefore have expected water to pass from the egg to the lime solution, thereby giving rise to an increased air chamber. That it does not can only be explained by supposing that the lime attacks the egg membranes, destroying their permeability, just as it attacks and wears away the shell.

The efficiency of water glass and lime water as a means of preserving eggs is without question. Used in conjunction with a rough system of cold storage (*i.e.*, paying no particular regard to constancy of temperature, but merely temperature limits) either method gives excellent results, with the preference, so far as the present experiments show, in favour of water glass. The cost of the water glass is small, and apart from the extra labour involved—*e.g.*, the washing of the eggs on removal from the solution—the only disadvantages are that the surface of the shell is marred, and there is every possibility of the shell cracking on boiling. It would seem, however, that further research might remove these objections. Moreover, there appears to be no reason why, if clean eggs alone are used, the same preserving liquid should not be employed for several storage seasons. Lime water possibly has the advantage in this respect, as it is definitely antiseptic and is less likely to suffer from mould and bacterial contamination than water glass under the same conditions.

YOUNG JUDGES' COMPETITIONS AT AGRICULTURAL SHOWS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Each year at the Royal National Show at Brisbane, at the Royal Show at Toowoomba, and at many provincial and country shows throughout this State, young judges' and novice judging competitions are scheduled, these contests covering the Horse, Beef and Dairy Cattle, Pig and Dog Sections.

That the contests are increasing in popularity is demonstrated by the liberal entry and the enthusiasm shown, and that they are not lacking in financial backing is proved by the fact that on every occasion donors come forward with attractive and equally liberal cash or trophy awards, while the societies themselves take an active part—first in providing the classes and in endeavouring to make them of more educational value, and secondly in making additional awards and arranging all the necessary detail to be observed in carrying them through.

At the Royal National Agricultural Show again this year Colonel Donald Cameron, M.H.R., has donated £50, representing first prizes to the value of £4 and second prizes £2 in six different sections, with an additional second prize of £2, while in the Illawarra milking shorthorn class the "Andrew Moles" memorial plaque is being presented in memory of the late Mr. Andrew Moles, an enthusiast in these movements. Medals and trophies form the prize money also in the section in which novice judges adjudicate on dogs.

A New Scheme.

However, it has become necessary, owing to the increased entry and to the somewhat unsatisfactory nature of the way in which previous contests were arranged, to introduce a new system—a system aiming at greater accuracy and of more practical value to the competitors, at the same time of greater educational value both to those actually engaged in the contest and to the onlookers, whether they be farmers or not.

A special sub-committee, of which the writer was one, have therefore submitted the scheme outlined herein, and which has been approved by the Council of the Royal National Agricultural and Industrial Association of Queensland for trial at the August Show, 1926.

Useful Hints for Young Judges.

The following suggestions have been prepared, not as the "sum total," as all young judges should note, but as indicating a number of special qualifications which fit a person to undertake the selection of animals or to act as a judge, no matter on what occasion or whatever the class of stock or product he has placed before him. The hints were in the first instance suggested for the young judges in the Pig Section in which two Berkshire boars were adjudicated upon, but being of general interest are published for the benefit of readers, one and all.

Note the Nature of the Useful Hints.

1. Be confident. Judges of any class of stock or product must know their business; they must understand the standard of excellence aimed at and the comparative value of each point on which the animal or product is judged.

Remember: The world makes way for the man who *knows*, the man who *knows* he *knows*.

2. Knowledge of your business inspires confidence. Young judges should not be afraid to ask questions on points on which they are not quite certain.

3. Be punctual in answering questions submitted to you by the judge, for judging is not guess work. If you give incorrect answers it is the duty of the judge to put you right. We live to learn.

4. Study the animal or the object you are to judge, and compare the respective points alongside those referred to in the standard of excellence.

5. Be prepared to undertake the judging of any other animal or class the judge may select to test your ability. You should practise judging and watch other judges at work as opportunity offers.

6. Study the list of disqualifications or objections to which reference is made in all standards of excellence. Judging is largely a matter of discovering faults or imperfections, and of comparing the seriousness of these faults with the increased value allowed for perfection. Some imperfections develop into disqualifications, some have hereditary tendencies, and tend to reduce the commercial value of the animal or product, some are of a less serious nature, and are not likely to influence the

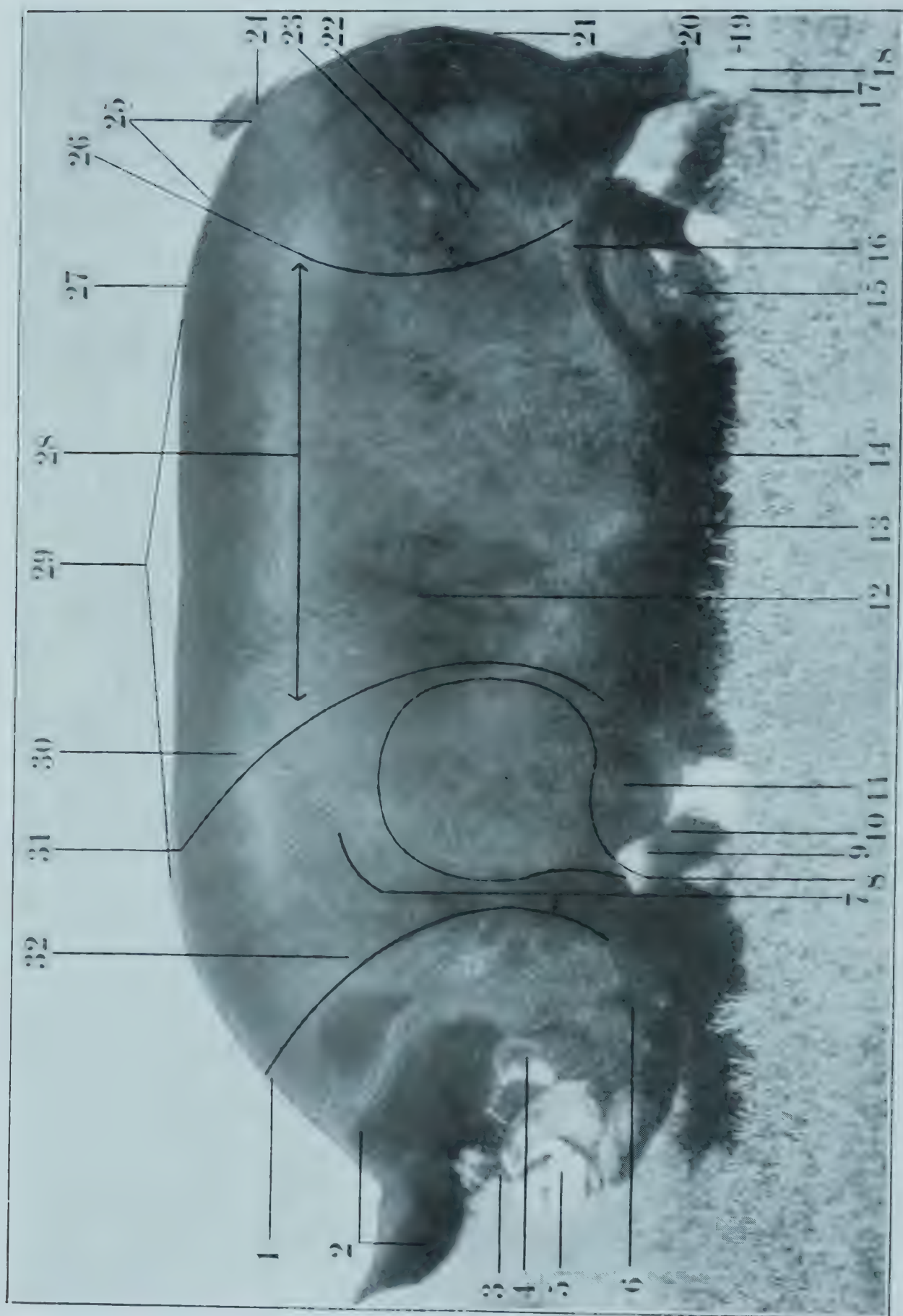


PLATE 32.—Tup. Pigs. of v. Pig.

DESCRIPTION OF PLATE 32.

Principal Points of the Pig.

1. Head.	9. Chest.	17. Foot and Hoof.	25. Rump.
2. Ears.	10. Knee.	18. Pastern.	26. Hindquarter.
3. Eyes.	11. Forearm.	19. Dewclaws.	27. Loin.
4. Face.	12. Side and Ribs.	20. Fetlock with Hoof Joint close to the Fig. 21.	28. Middle Piece.
5. Nose or Snout.	13. Belly.	21. Site of Testicles in Males.	29. Back.
6. Cheek or Jowl.	14. Site of Sheath in Males.	22. Stifle.	30. Top of Shoulder.
7. Shoulder.	15. Teats.	23. Ham.	31. Forequarter.
8. Shield or Shoulder in Males.	16. Flank.	24. Tail.	32. Neck.

animal's value for show or stud purposes, but it is the animal whose scale of points approaches perfection who realises the highest value, and for whom there will be keenest competition if offered for sale.

7. Be careful in filling in your award cards, and be accurate with your figures. Officials of the society and representatives of the Press will inspect your cards.

8. Be prompt in attendance, and if unsuccessful in gaining the coveted awards, be a good loser and come up smiling again next time.

9. Carefully note the following:—In judging and selecting pigs, the following points should be specially noted:—

- (a) Constitution as noted by general healthy appearance of animal, the quality of its skin and hair, the width between the eyes and ears, the width and depth of chest and body, the strength of the legs and feet, and by the animal's vigour.
- (b) Pedigree.—For stud purposes, it is essential that the animal's pedigree should indicate careful breeding, that the parent stock were of reliable, vigorous, and profitable strains, and that, in the case of a sire, he be unrelated to the dams to which he is to be mated.
- (c) Type and Quality.—Type is important, as indicating the result of careful selection of the parent stock. Quality counts for much in the commercial world. Quality stock always realise top prices; they pay handsome dividends.
- (d) Temperament.—Contentment and docility indicate the temperament of the animal. Note the appearance of the eye; a white streak in the eye is regarded as a sign of bad temper.

10. Value Your Animal.—A judge is quite within bounds in asking the approximate value of an animal or of its products. Practical experience and knowledge of the commerce of the animal is invaluable.

The Aim of These Competitions.

Young judges' competitions aim principally at one special objective—viz., that of training judges, not only for the purpose of judging at agricultural shows, but more particularly in training them to become efficient in the selection of any class of stock they may be called upon to handle in the ordinary routine of farm work, and to know type, quality, and value when actually selecting stock for their own purposes on the farm, for there is no more important initial step in taking up stock raising than in being able to act on one's own initiative in inspecting and in purchasing breeding or store stock. It is important also when once stock have been produced that the breeder should be able to determine their commercial value and to know whether they are worth retaining in the stud or not. It is the desire of the promoters of these competitions that, as a result of the knowledge gained in taking part in them, contestants will seriously consider following the matter up with a view to some day being appointed a judge in some one or other section of agricultural or other show activities, for certain it is that we need to train judges competent to undertake this important phase of agriculture. It is advisable for young judges to become associated with the agricultural society in the district in which they reside, as well as with the larger district and Royal shows. Junior farmers should also consider the advantages of becoming members of the Breed Societies controlling the interests of the breeds in which they are most interested, and to become subscribers to one or other of the Agricultural Journals specialising in or devoting space to these breeds.

The Department of Agriculture and Stock, as well as the Agricultural Societies, are prepared to supply any further information required at any time.

The Breeds of Stock to be Adjudicated Upon.

Competitions at the Royal National Show for young judges cover Clydesdale stallion, Shorthorn cow, Hereford cow, Ayrshire cow, Jersey cow, Illawarra Milking Shorthorn cow, Friesian cow, Guernsey cow, Berkshire boar, Tamworth boar, Fox Terriers, and Cocker Spaniels.

As this article deals principally with the judging in the Pig Section, the standards of excellence and other information for the Berkshire and Tamworth breeds of pigs only are given. Standards for any of the other breeds to be adjudicated upon would be supplied direct by the Royal National Association.

The standards of excellence are worthy of careful note. The standards should be used as a guide when practising judging and be preserved for use when actually selecting stock in these breeds. They are the official standards recognised by the societies controlling these breeds.

The score card for Boar and Sow pigs with the scale of points have been specially adapted for use in these competitions; they are not set out in the same way as an official scale of points would be, as for this purpose the more detailed scale of points would be unnecessary. This particular scheme has been adopted to enable the young judge to calculate the comparative value of the points to be allotted to each animal. These score cards will not be used on judging day; they are for practice and for reference only. The only card the young judge will have to fill in is the examination card (see page 148) to which reference is made below.



PLATE 33.

Facsimile of Gold Medal presented at Toowoomba Show, 1926, in the Young Judges' Competition (Pigs) and won by Mr. "Bert" Whittaker, Broxburn Stud Piggery, Broxburn, Darling Downs, Q.

Score Cards for Boar and Sow Pigs.

SCALE OF POINTS.

(a) *General Appearance*—

1. Action—Distinguished, smart, active.
2. Skin—Smooth, pliant, scurfless, and free from wrinkles.
3. Hair—Plentiful, fine, short.
4. Form—Deep, broad, long, compact, standing squarely on legs.
5. Breeding organs in boar—Sheath free from inflammation and testicles medium size and evenly placed. 25

(b) *Head and Neck*—

1. Ears—Thin, pricked, and inclined slightly forward.
2. Head—Medium-sized, broad between eyes, eyes bright and kindly.
3. Jowl—Full, clean, running well into neck.
4. Neck—Muscular and broad, evenly set on shoulders, medium length. 20

(c) *Forequarters*—

1. Shoulders—Broad, deep, full, and compact.
2. Chest—Wide, deep, and full.
3. Girth—Good depth and width around heart.
4. Legs—Straight, short, strong, pasterns upright. Feet compact and medium size. 25

(d) Body—

1. Back—Long, straight, and slightly arched.
2. Sides—Deep and well let down, with well-sprung ribs, level under-line.
3. Belly—Full and thick with at least 12 teats.
4. Loin—Full and wide, powerful, and not drooping.
5. Flank—Thick, well back, and reaching down on to leg. 30

(e) Hindquarters—

1. Rump—Long, wide, evenly fleshed, and not drooping.
2. Hams—Broad, long, deep, and fleshy down to hock.
3. Tail—Fine tapering, short, and set well up, nearly level with back.
4. Legs—Straight, short, strong, pasterns upright. Feet compact and medium size. 30

Total 130

Note.—In individual breeds the Form, Head, Ears, and Colour, &c., vary somewhat, hence the above is only a general description.

The following are all regarded as objectionable features in either a Berkshire or a Tamworth boar.

Action—Sluggish and clumsy.

Hair—Coarse, curly, bristly, or maney.

Form—Predominance of certain points, especially heavy shoulders or fore-quarters generally, weak loins and light hams.

Breeding Organs—Boars: Rupture, one testicle only down.

Sows: Deficiency in, or very irregularly placed, or blind teats, injured or diseased udder.

Head—Narrow between ears.

Shoulders—Coarse, heavy, or wide and open on top.

Chest—Narrow, with both forelegs apparently coming from almost the same point.

Legs—Crooked, weak, pasterns down, feet flat or splayed.

Back—Weak and hollow when pig is standing at rest.

Sides—Shallow or not well let down; flat or short curved ribs.

Belly—Flaccid, or wanting in muscle, or gutty.

Loin—Narrow and weak.

Flank—Thin and not well let down.

Rump—Short, narrow, or drooping.

Hams—Narrow, wanting in depth.

Tail—Coarse or set low.

The Examination Card.

ROYAL NATIONAL AGRICULTURAL AND INDUSTRIAL ASSOCIATION OF
QUEENSLAND.

YOUNG JUDGES' COMPETITION.

Examination Card.....

1. Place the animals before you in their order of merit, giving halter or pen numbers.

First.....

Second.....

Third.....

2. How does the animal you have placed first compare with the highest standard you have in your mind?

.....

.....

.....
3. State the outstanding points in the animal you have placed first.

.....

.....

.....
4. State where the animal you have placed second fails in comparison with your first choice.

.....

.....

.....
5. State where the animal you have placed third fails in comparison with your first choice.

.....

.....

.....

Name.....

Date.....

The young judge will be requested to fill in the details asked for on the Examination Card, and after having judged the boars and having placed them in the order of merit he considers they should occupy, should sign and hand the cards in to the steward in charge of the competitions. Care should be taken to write plainly and to keep the cards clean.

Colour, type, conformation, character, and general appearance vary with different breeds. Males should be distinctly masculine and females distinctly feminine in character, irrespective of breed. The pig is a quick-growing, early-maturing animal, hence size and condition for age count for much. Other important characteristics are:—Constitution, temperament, pedigree, quality, prepotency, prolificacy, and adaptability.

Standard of Excellence for Berkshire Pigs.

As adopted by the Council of The Australian Stud Pig Breeders' Society.

Colour—Black, with white on face, feet, and tip of tail.

Skin—Fine, and free from wrinkles.

Hair—Long, fine, and plentiful.

Head—Moderately short, face dished, snout broad, and wide between the eyes and ears.

Ears—Fairly large, carried erect or slightly inclined forward, and fringed with fine hair.

Neck—Medium length, evenly set on shoulders; jowl full and not heavy.

Shoulders—Fine and well sloping backwards, free from coarseness.

Back—Long and straight, ribs well sprung, sides deep.

Hams—Wide, and deep to hocks.

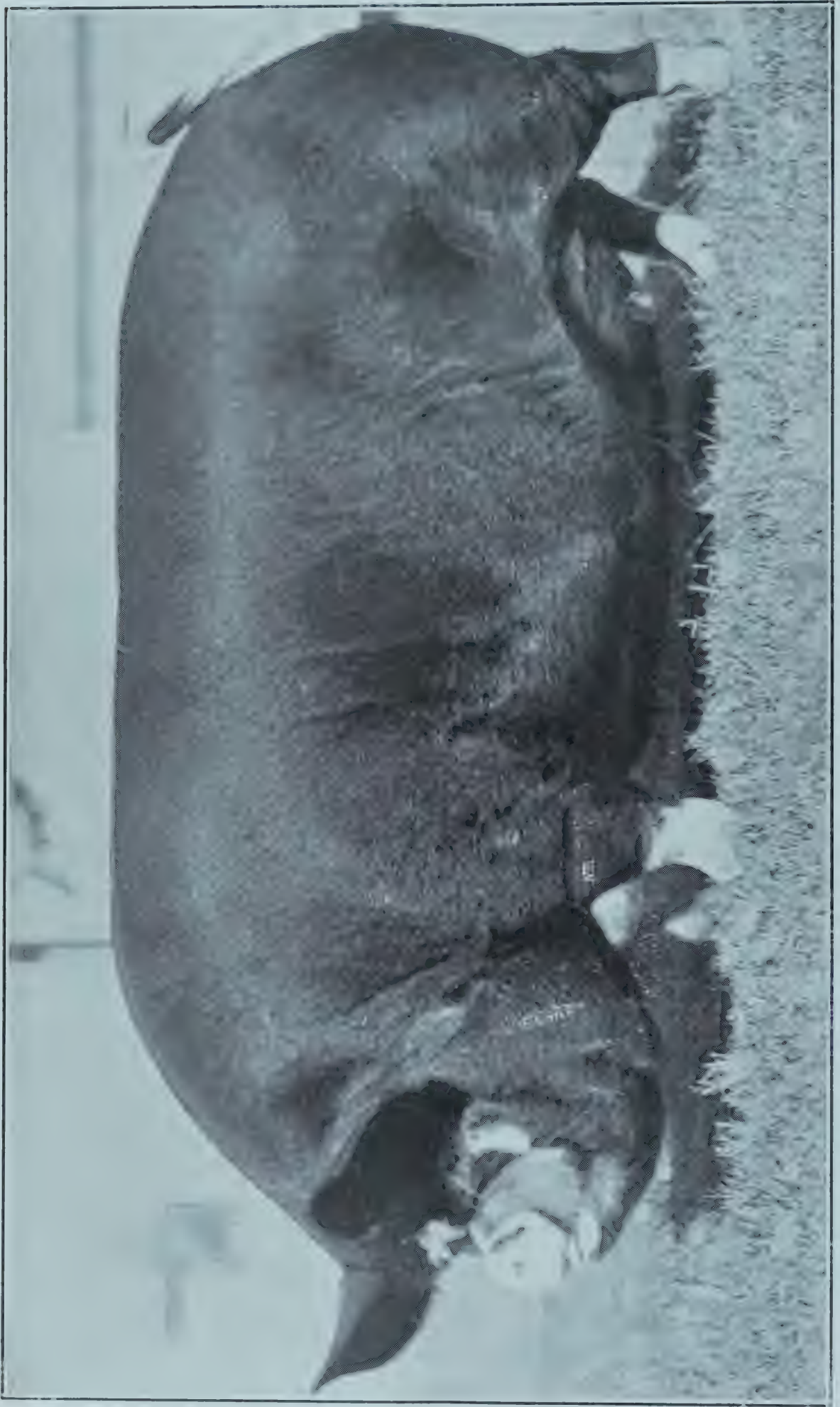


PLATE 34.—A VICTORIAN-BRED BERKSHIRE SOW, "TOPSY OF YARRA" (3702)
Her progeny have been consistent prize-winners. She also won many prizes at Victorian and New South Wales Shows. She represents a



PLATE 35.—TYPICAL BERKSHIRE BOAR “WILCANNIA SPECIAL” (3709).

Property of Mrs. E. M. Lennie, a noted Victorian breeder. This boar has a wonderful prize record, and his progeny have a record of which any stud breeder might well be proud. His markings are characteristic of the breed, while he is of excellent type and conformation.

Tail—Set high and fairly large.

Flank—Deep and well let down, making straight underline.

Legs and Feet—Short, straight, and strong, set wide apart, and hoofs nearly erect.

OBJECTIONS.

A perfectly black face, foot, or tail; a rose back; white or sandy spots, or white skin on body; a white ear; a very coarse mane; and inbent knees.

Standard of Excellence for Tamworths.

The principal characteristics of the breed, as set out in the standards adopted by The National Pig Breeders' Association of England, are as follows. The Australian Stud Pig Breeders' Society have a similar standard for this breed.

Standard of Excellence, Tamworth Boar or Sow.

Coat—Golden red, abundant, straight, and fine, and as free from black hairs as possible.

Head—Not too long, fact slightly dished, wide between ears, jowl light.

Ears—Rather large, with fine fringe, carried rigid, and inclined slightly forward.

Neck—Light, medium length, proportionately and evenly set on shoulders.

Chest—Wide and deep.

Shoulders—Light, free from coarseness, and in alignment with forelegs below, and with side as seen from in front.

Legs—Strong and shapely, with good quality bone, and set well outside body, pasterns short and springy, standing well up on toes.

Back—Long and level, slightly arched transversely above shoulders.

Loin—Strong and broad.

Tail—Set on high and well tasselled.

Sides—Long and deep.

Belly—Straight underline, and in a sow a fair number of sound teats evenly placed.

Flank—Full and well let down.

Hams—Well developed, deep, full to hocks, and giving a tense appearance.

Skin—Flesh coloured, free from coarseness, wrinkles, or black spots.

Action—Firm and free.

In earlier standards of excellence several objectionable features in Tamworths were referred to. We list them here for the benefit of breeders not fully conversant with this type.

Objectionable Features in Both Boar and Sow.

Head—Narrow forehead, kinked or upturned nose.

Ears—Thick and coarse or drooping too far forward; loose and lopped ears are also objectionable.

Jowl—Thick, coarse, and heavy.

Shoulders—Coarse, heavy, or wide, and open at the top.

Ribs—Flat or short curved, light back ribs.

Loin—Narrow or weak.

Belly—Flaccid, or wanting in muscle, gutty or podgy.

The Disqualifications Included—

Colour—Black hairs or patches on the skin. (It will be noted these are still considered objectionable.)

In Boars—Rupture, or only one testicle let down, vicious temper, coarse, wrinkly, or ungainly.

In sows—Deficiency in or very irregularly placed or blind teats, injured or diseased udders, vicious temper, hollow back, coarse or heavy mane; poor breeding qualities.



PLATE 36.—TYPICAL TAMWORTH BOAR “BLAKENEY SYDNEY” (389).

Property of Mr. F. Ebbun, of Kelso, N.S.W., winner of First Prize and Champion, Sydney Show, 1926 ; also First and Champion, Bathurst (N.S.W.), 1926. A neat attractive type of Tamworth, full-fleshed and well-developed, yet not coarse.



PLATE 37.—CHAMPION PRIZE-WINNING TAMWORTH SOW "MANSING ELENORA" (243).

This sow appears as one of the most typical and up-to-date Tamworths yet exhibited at Australian Shows. This sow was also a prize-winner at Brisbane Royal National Show. Note her compactness, which, and depth of ham and side and the fine, curly skin, are the

JUDGING PIGS—A FEW USEFUL HINTS.

It is a great advantage to be systematic in judging any class of product or animal in order to do justice to each point and to make sure that no essentials are overlooked. Judges should be consistent, too, in regard to type and conformation. Production records are important and should be inquired for as the judging proceeds.

A good plan is to approach the animal from the front.

Front View.—Here observe the width of back and uniformity of width throughout, remembering that the most productive and valuable animals are those that are specially well developed in the back, loins, and hindquarters; the width and smoothness of top of shoulders, the evenness with which the neck connects to the shoulders, the width of the head, its length and shape; width between eyes and ears and the shape and set of the ears should then be noted. The presence or absence of wrinkles, dish in the nose, the face, clearness of eyes, which should be bright and kindly, and the facial markings are important. Look for tusks and overgrown teeth in aged pigs; they are objectionable.

Next move to the side of the animal.

Side View.—From here observe the dish of the face, trimness of the jowl, the way the jowl carries back along the neck, the length and appearance of neck, presence or absence of a coarse, heavy mane along top of shoulder and neck, the depth and width of chest, the strength of the topline and straightness of underline. Far too often there is a droop just back of the shoulders, sometimes even forming a crease (called a "devil's grip") at this point. The topline should rise gradually from the neck to the loin, then slope away very slightly to the tail, thus giving a very strong, slightly arched back. The presence of wrinkles in the skin along the side should be noted; they are very objectionable. Some pigs are almost like a concertina in this regard. Note the length of the middle piece, the depth of the sides, the length and fullness of the rump, the width and depth of the ham, and the degree to which the flesh develops forward towards the stifle and downwards towards the hocks; hams should be deep and fleshy to the hocks. A "cut up" flank is objectionable; it gives a very undesirable appearance to the hindquarters, besides reducing the amount of meat on the ham. The straightness and length of both fore and hind legs should be carefully noted; many pigs are very weak in the forelegs; the length of the pasterns and the way in which the pig stands up on his toes, for pigs are not flat-footed creatures. The type and conformation of the animal will be noted from a side as well as from a front or rear view.

Rear View.—From behind the pig observe the width and evenness of the hindquarters and the filling down between the hams (the crutch as it is called in sheep). Note the general uniformity of width; the back must be broad and nearly level or, as stated, slightly arched; any sign of roach or razor back or of a hollow back to be accounted a fault. Stepping slightly to one side, though still behind the animal, the straightness with which the side carries down to the belly is to be observed. Here also in the female a good view will be obtained of the belly and teats, the latter to be specially noted, as from twelve to fourteen in number, evenly placed, clear, and distinct. Many sows have dummy or blind and very small undeveloped teats; in some cases the teats are not placed evenly along the line of the belly. In the male it is equally desirable that he should have a good line of teats, though in his case they are purely an indication of the prolific nature of the strain or otherwise. Note should be made that in the male there be no sign of enlargement at the point of the sheath and no sign of umbilical hernia (rupture of the navel). It is wise to note this in the sow also, as it is a common weakness. Now note the straightness of the hind legs to see that they are not cow hocked or turned in at the toes. Overgrown toes are objectionable, as are large, flat, splayed feet. The opposite side should now be surveyed for much the same points as already noted. In the male note should be made of the testicles and of the scrotal sac. The testicles should both be of even and medium size, be evenly placed in the scrotal sac, and should hang free, not tucked up or very tight. There should be no sign of rupture (in this case called scrotal hernia). The way in which the tail is set on the body should be noted; it should be fine and evenly set nearly on a line with the level of the back, and be well tasselled in the case of the Berkshire, having a distinct white flag or switch of hair. The hair and quality of the skin should be carefully noted, and in order to ascertain degree of fineness or coarseness the animal should be handled freely. Quality is noted by fine silky, glossy hair and a mellow skin, free from scurf or scale. The mellowness of the flesh may be largely determined in this way, while the condition of the animal will be noted. A final survey should be made to note colour markings and any special features, like shape and set of ears, &c. Be very careful to note that undershot or crooked or very short lower jaws are objectionable; while a protruding tongue is highly objectionable. Special head characteristics always, of course, demand consideration. If one practises a systematic method in going about

the routine of judging there will be but few points overlooked, and as one has experience it is not so difficult to select the superior and to reject the inferior ones. For final selection the first four or five animals should be brought as close together as possible and their respective points considered and compared. The most typical and the one showing the best markings would then be selected for first place, the others being ranked according to order of merit. Fancy breed points must always receive very special consideration, but should not be allowed to outweigh the more important points of conformation, type, quality, and prolificacy.

The writer is never afraid to ask for or to recommend a lengthy prize list, first, second, third, highly commended, and commended, with a very highly commended place in a large entry, and always remembers to place a reserve championship for both boar and sow.

There is no reason why prize money and conditions and the allocation of printed ribbons should not be inquired into by the pig judge, for the more interest he displays in the animals and the section in which they are exhibited, the better the result from the standpoint of all concerned.

CONCRETE FEEDING FLOOR FOR PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Visiting a large suburban piggery recently, the writer drew the attention of the owner to the necessity of constructing a concrete feeding floor on which to feed the pigs that were not kept in sties and that were fed from troughs scattered here and there through the yards. It had rained during the morning of the visit, and the mud was ankle deep in the yard where the pigs were about to be fed. As it happened it was the midday feed (a sort of light sandwich luncheon), and consisted largely of greenstuff, cabbage, cauliflower, and lettuce leaves, carrot, and parsnip tops, a few potato peelings, &c. The farmer simply walked about the yard emptying the contents of the pig tin on the ground on top of at least three inches of mud, and in the mad scramble that followed as soon as the sows heard the dinner bell, there were soon no greenstuffs to be seen; what had not been devoured had been trampled in the mud, and of course the hungry ones were ploughing their noses through the slush and slime in search of some remnants of the midday lunch.

To say that the system was filthy and disgusting did not seem to worry our friend, for he was content to let the sows take their chance; if they survived they were "good 'uns"; if they failed to make good on the menu, well, they were simply thrown out as unprofitable, and some other poor creature got the job.

Now all this filth and stench can be avoided, and it is guaranteed that a concrete feeding floor will pay for itself in a month, and the pigs will benefit in a hundred different ways. There is not only greater gain in weight if the pigs feed on a floor where the food cannot be lost, and where accumulation of filth can easily be prevented, but there is less loss of good food, and a greater profit from that which is consumed. We must also consider sanitation if we expect our pigs to be healthy. Concrete floors are hard, easy to clean, and can be flushed or hosed over in a few minutes after use; a bucket of disinfectant sprayed or thrown across the floor will keep it clean for next feed. The labour of feeding and keeping the yards in order is also considerably reduced, and this is a proposition that must be faced.

The size of the floor will, of course, depend on the number of pigs to be fed, hence no standard size can be recommended. In shape, the floor may be oblong or square. The latter is preferable. Make it big enough to accommodate about thirty sows or fewer than this if need be. Use a 1-2-3 or a 1-2-4 mixture in making the concrete, and in thickness have the floor laid on a good solid foundation, allowing a clear 4 inches of concrete for the floor. The sides should be protected and this is best done by excavating the soil for a depth of, say, 8 inches all round, and about 4 inches wide, and making a shallow foundation and protecting wall all round; this might be levelled off on the surface or formed into a shallow half-round drain. The object of this outside wall is to prevent the pigs from rooting under the floor and heaving it up, as they are liable to if it is left unprotected. The floor should have a fall from the centre to the outside of, say, half an inch per foot. The gutter round the outside could be connected with a drain to carry away the washings and thus enable the whole to be kept clean. If the yards are large enough it is an advantage to fence the feeding floor off; the food can then be scattered over the floor and be all ready for the pigs when the gate is opened, and the meal begins. These concrete feeding floors are a necessity on every pig farm, and their cost is a mere detail when compared with the advantages they offer.

PIG RAISING PAMPHLETS.

Illustrated pamphlets on the subject of Pig Raising are available for distribution, gratis, on written or personal application to the Department of Agriculture and Stock, William street, Brisbane, as under:—

Feeding and Management of Pigs.

Feeds and Feeding, the Use of Mineral Mixtures, a Gestation Chart, Flushing the Breeding Sow, Dentition of the Pig, Pigs for Profit, Early History of the Pig.

Breeds of Pigs.

Berkshire, Tamworth. Other breeds are being dealt with now and their special qualifications featured. These pamphlets will be available shortly. They form a useful and attractive series.

Housing the Pig.

A series of pamphlets on the construction of sties and provision of paddock accommodation for pigs give details in regard to housing and accommodation. This series is being added to from time to time, is well illustrated with photographs and drawings, and should be in the hands of every farmer.

Marketing Pigs in Queensland.

Parts 2 to 8 inclusive. Note.—Part 1 being out of print has been rewritten and its contents included in the series. More articles on this subject are in course of preparation and will be available in pamphlet form later.

Pig Clubs for Boys and Girls.

The Pig Club pamphlet, descriptive of the organisation and development of Pig Clubs, is now in print and will shortly be available for distribution. Copies may be obtained with any other information relative to the scheme on application to the Instructor in Pig Raising, Department of Agriculture and Stock, Brisbane.

Diseases of the Pig.

Pamphlets dealing in a general way with diseases and with the Administration of Medicine to Pigs, Diarrhœa or White Scour, Paralysis of the Hindquarter, A Peculiar Disease of the Ear of the Pig, Hairlessness or Goitre. Leaflets on profitably feeding Iodine to Pigs and on other subjects are also available. They carry much useful information.

Pig Raising in Queensland.

Profusely illustrated and brought up to date. This pamphlet is in process of revision and will be available, gratis, shortly.

FLUSHING THE BREEDING SOW.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

In perusing the pages of several of the older established text-books on "Animal Husbandry" one frequently comes across the term "flushing" as applied to "flushing the mare" or the ewe or the sow or cow or as the case may be, in each instance prior to the time the female is mated.

This "flushing" is not a common term in Australian live stock literature nor is it a regular practice on our farms, consequently an explanation of the term "flushing the sow" before mating will be of interest to readers of this Journal.

The term flushing simply means a general stimulation of the whole of the internal organisation of the animal, the object being to increase the number of pigs produced at farrowing time. The purpose is accomplished by increased feeding of grain or by the use of fresh or more succulent pastures than have previously been available.

The practice is understood and practised more by the sheep man than by the breeder of pigs or of most of the other classes of live stock; still it is a well recognised old time as well as modern practice. The sheep man follows it by turning the breeding ewes into a fresh succulent pasture just prior to "joining the rams," the time when the ewes are to be mated, the objective here being to secure a larger percentage of twins or a higher general average at lambing time.

There is no reason why the pig breeder should not adopt the same practice with his breeding sows, especially with sows that are advancing in age and that might otherwise produce rather unsatisfactory litters.

The most beneficial results are obtained when the flushing begins two or three weeks before the breeding season opens. Supposing that the sows have been running on pasture alone during the greater part of the "off" season; at the beginning of the breeding season or when the sows are about to be mated they should be turned into a fresh patch of rape, lucerne, or other green stuff that would furnish an abundance of the most succulent forage.

Answers to Correspondents.

Itch in Horses.

A correspondent has a horse suffering from itch. He rubs against stumps and fences, and in summer, when the attacks seem more severe, he loses a lot of condition. Mange cures and powders have proved ineffective. The matter was referred to the Chief Inspector of Stock (Major A. H. Cory, M.R.C.V.S.), who advises:—Treat the affected part by washing well with warm water and soda. After the animal is dry, the following dressing should be applied once daily for three days: Sulphur, 4 oz.; creolin, 3 drams; linseed oil, 1 pint. Allow the dressing to remain on for three days after the last application, then thoroughly wash off and repeat dressing after an interval of a week. In addition to the treatment prescribed, it is advisable to give the horse 1 oz. of liquor arsenical in its food or drink-water once daily for seven days. This can be repeated after a fortnight's interval.

Stock Fodder—Bottle Tree—Cotton-Seed Meal—Grain.

F. H. N. (Capella)—

The sample of Bottle Tree was handed to the Agricultural Chemist, Mr. J. C. Brännich, and following is his analysis:—

The pith of the Bottle Tree contains water, 78.6, protein, 0.8, fat, 0.2, starch and carbohydrates, 2.4, fibre, 16, and ash, 2 per cent., and is, therefore, a poor fodder deficient in nitrogenous matters (protein) and has a slightly better value than prickly-pear leaves, but poorer than pumpkins. Any meal like cotton-seed meal can only be fed in small amounts, 2 or 3 oz. per sheep, with other roughage. At the present market price barley is the cheapest food and better than maize.

BOTANY.

In the course of the month the Government Botanist (Mr. C. T. White, F.L.S.) addressed the following replies to correspondents, and which are of general interest:—

“Charlock” or “Wild Mustard” (*Sinapsis arvensis*).

E. J. B. (Columboola)—

Your specimen is “Charlock” or “Wild Mustard” (*Sinapsis arvensis*), a common European plant now distributed as an agricultural weed over the temperate regions of the globe. It is a bad weed in the colder countries, including Victoria and Southern New South Wales, but in Queensland is usually seen as a stray plant or so in garden or field crops. It belongs to the cabbage and turnip family; the plant is harmless in its young stage, but the seeds are poisonous, causing inflammation of the stomach and intestines. In Europe stock have at times been poisoned by eating chaff and grain which contained charlock seed. Where the weed is bad is particularly in wheat fields; spraying with copper sulphate or sulphate of iron is usually resorted to; however, in Queensland the weed can usually be coped with by ordinary hand pulling.

Forestry Specimens Identified.

“QUERIST” (Brisbane)—

The specimens were identified as No. 117, *Xylocarpus* sp.—A very interesting specimen. Only one species of this genus has been recorded from Australia, and the specimens sent seem distinct from this. The flowers sent in, with one exception, were all male, and it would be extremely interesting to obtain further specimens, especially fruiting ones.

No. 118, *Acacia Maidenii*.—Maiden's Wattle.

No. 119, *Pittosporum revolutum*.

No. 120, *Diospyros australis*.

No. 121, *Nephelium tomentosum*.

Tree Identified (*Erythrophloeum Labouchei*).

J.F.O'N. (Barabon, N.Q.)—

The tree is known botanically as *Erythrophloeum Labouchei*, and is common to North Queensland, the Northern Territory, and the northern parts of Western Australia. The genus contains about 125 species distributed

through different parts of the tropics of the Old World. *E. guineense* is one of the poisonous plants used by the pygmies of Central Africa in the preparations of arrow-poisons. An alkaloid called erythrophleine has been extracted from the tree and has been identified as the active poisonous principle. The Australian tree was examined chemically by Dr. James M. Petrie, of Sydney, in 1921, and he found the same alkaloid present. All parts of the plant are poisonous; sheep may be poisoned by eating the fresh green growth which sometimes springs up round the base of the trees, or in a dry spell may pick up fallen leaves from the trees. In Western Australia the tree goes under the name of "Camel Poison" from the fact that camels more than other stock eat the leaves. It is recorded in Western Australia that inhaling the smoke of the burning wood is superstitiously avoided by native women. Mr. A. Meston, writing of the tree, says that it is dreaded by the aborigines and that "a splinter needs about the same treatment as snakebite."

"Cork Tree" (*Erythrina vespertilio*).

O.M.P. (Atherton)—

Your specimen sent is not *Duboisia myoporoides*, but *Erythrina vespertilio*, the Bat's Wing Coral Tree (so called from the peculiar shaped leaflet). The name Cork Tree is commonly applied to this tree in Queensland, perhaps more so than any other. *Duboisia myoporoides* and its ally *D. Leichhardtii* are also both commonly called "Cork Trees."

"Caustic Plant" (*Euphorbia eremophila*).

E.M.B. (Yaraka, C.Q.)

The specimen is *Euphorbia eremophila*, the Caustic Plant. It is widely distributed in Australia and is generally regarded as badly poisonous. Regarding the dry plants, the genus *Euphorbia* contains several species known to be poisonous to stock; drying is generally thought to reduce the toxicity, but not to eliminate it. Your last season's plants, however, are particularly old and dry, and without a feeding test a definite statement could not be made on them. Your query regarding the treatment of affected animals has been referred to the Chief Inspector of Stock.

Milky Cotton Bush (*Asclepias curassavica*).

J.L. (Townsville)—

The particular species of *Asclepias* you refer to is *Asclepias curassavica*. The plant is very common on coastal farms throughout Queensland, but is not generally eaten by stock to any great extent. A note on this plant appears in this issue of the Journal.

Plants Poisonous to Stock.

W.C.W. (Bowen)—Your specimens are identified as:—

- (1) *Trema aspera* (Peach-leaf Poison Bush).—This plant is generally regarded as poisonous to stock; at times it develops a prussic acid yielding glucoside, and when eaten in this stage in quantity by hungry stock may cause death. I think, however, it is much overrated as a poisonous plant. A leaflet on the weed has been posted.
- (2) *Solanum torvum* (Devil's Fig).—Nothing much is known about the properties of this plant; the green berries, if eaten in quantity, might prove harmful.
- (3) *Crotalaria striata* (Rattlepod).—Poisonous. See leaflet.
- (4) *Asclepias curassavica*.—This plant is poisonous, but is not usually touched by stock to any extent. A note dealing with it is published in this issue.

From the foregoing you will see that it is advisable to cut out all the above plants from the property. In scrub areas where is a good deal of undergrowth and weeds it is very often difficult to name any one plant as the cause of mortality in stock. In such cases it is advisable to brush out all suspected plants.

ROSENTHAL (Warwick)—

The specimens proved to be:—

- A. *Acacia iziophylla*.—A small wattle, not known to possess any poisonous or harmful properties.
- B. *Myoporum deserti*.—Turpentine Bush, Ellangowan Poison Bush, or Dogwood Poison Bush. This shrub has long held a bad reputation as a poisonous plant, being particularly dangerous to travelling stock. In the absence of feeding tests we have very little authentic information on the plant, but it is supposed to be a slow poison, and the effects to be worse after rain.
- C. Leaves only, and determination therefore difficult. It is evidently a member of the family Myoporaceae, and I think is *Myoporum acuminatum* (a Turpentine Bush). Very little is known about this plant, but the properties would no doubt be very similar to those of *M. deserti*.

“ Tie Bush ” (*Wickstroemia indica*)—Poisonous Plants.

E.D.L. (Yandina)—

The plant you send for identification is a species of “ Tie Bush ” (*Wickstroemia indica*). The local name is applied to this plant and some of its allies on account of the tough fibrous nature of the bark. The bush has been suspected at times of poisoning stock. In feeding experiments with heifers at Yeerongpilly the plant scoured them badly, but did not prove fatal. Two young heifers were fed for twelve days—on the fifth day scours were produced, on the sixth day scours with a trace of blood (temp. 102.4), at the end of the eighth day the condition improved somewhat, were slightly better the following day, and continued to the end of the experiment. The conclusion drawn was that “ As the plant is one generally avoided by stock, the animals ate a great deal more than they would under ordinary conditions, and it appears to have had no other effect on them than to cause severe scouring. Had the feeding been continued, the animals would quite likely have died from scours and malnutrition, but stock would hardly ever eat sufficient of the plant for this to occur under natural conditions.” I am inclined to look for the trouble elsewhere. The Tape Vine is a poisonous weed common on scrub farms on the North Coast. It has round heart-shaped leaves, glossy green above and pale beneath.

“ White Apple ” (*Eugenia cormiflora*).

F.K. (Innisfail)—

The tree is *Eugenia cormiflora*, a native of the “scrubs” of Northern Queensland; it is sometimes known as “White Apple” from the large white fruits borne on the trunks. Not very much is known about the timber, but it is reported to be close-grained and tough. Some of the same genus (*Eugenia*) yield timber of fairly good quality—e.g., the Water Gum of the Atherton Tableland (*Eugenia gastavoides*) and the Eungella Gum of the Mackay District.

BREEDING, FEEDING, AND CARE OF PIGS.

Following are selected replies to correspondents by the Instructor in Pig Raising (Mr. E. J. Shelton, H.D.A.) in the course of the month, and which are of general interest:—

Rupture in Pigs.

W.E.J. (Nanango)—

It is evident from the tone of your letter that this trouble is an hereditary one due to some weakness in the breeding organs of the boar or to some distant hereditary influence in the sow. Rupture may, of course, be due to accidental causes, though it is not usual for more than one pig to suffer in this way. When numerous pigs show indications of either umbilical or scrotal hernia (rupture), it is usual to look for the cause in hereditary influence. We do not usually recommend castration of ruptured pigs; it is better to fatten them off as porkers and to sell to the local butcher or use them as food on the farm, for special knowledge is necessary in operating to ensure complete success, and unless you had a knowledge of the ordinary operation and had experience in carrying out this work we doubt whether it would be possible in the absence of illustrations to fully explain all the detail. A special pamphlet on the subject of castration is in course of preparation.

Linseed Meal for Pigs.

G.E. (Mount Larcom)—

Your assumption that linseed has almost double the feeding value of pollard for pigs is not altogether correct, though from chemical analysis it could be shown that both the protein and the crude fat in linseed are very much higher than in pollard. In practice, however, we find that it does not suit the animal's internal organisation to feed linseed and oil meals generally in the same way as we use pollard, nor does it pay to attempt to raise pigs on very highly concentrated foods like linseed or linseed-oil meals, in the absence of bulky, more fibrous, even if somewhat indigestible, foods. The addition of a comparatively small proportion of linseed-oil meal or a protein meal or meat meal (10 per cent. or 20) to the ration of pigs would, under your circumstances, be recommended, but the proportion of these concentrates can be reduced still further by substituting green foods and root crops if they are available.

It is certainly a very difficult problem looking for cheap pig foods during seasons like the present when maize is scarce and high priced and when pollard and similar meals hover around from £10 to £12 per ton. We have been recommending barley pollard at £11 per ton as superior to other foodstuffs at similar price; this can be obtained from Roma street merchants, while rice meal, obtainable from Robert Harper and Co., Brisbane, is also available. We forward one or two booklets with a number of pamphlets going to you; these have special reference to meat meal and protein meal. However, in the absence of these other meals we would still recommend keeping to pollard and adding, say, 10 per cent. of linseed-oil meal. Many feeders are using a proportion of molasses also, though this is only a heat and energy producer and does not contain any proteins; it tends to make coarser foods more palatable, and is in that respect worth while, though only 10 per cent. or so should be used.

Meggitt's linseed meal, as you state, carries more bulk than most other oil meals, still it must be used very carefully in the absence of green foods, roots, or more bulky foods. The footnote in regard to caution in the use of linseed refers principally to its content of hydrocyanic acid and prussic acid yielding glucosides, and not to its high protein content.

We recommend growing all the green food and root crops you can in good seasons and making preparation for dry spells by conserving grain, even if otherwise high priced. While pork is comparatively low in price and feeding stuff very high, it needs very careful management in order to make pigs pay.

Pig Breeding and Feeding.

F.J.P. (Dallarnil)—

It is difficult without inspection to determine definitely the actual cause of poor pig returns, but seasonal conditions generally have been bad. Perhaps you have been rather too liberal with concentrated foods, grain, &c., and have not had enough green food. Only good-conditioned stock that have well balanced rations, including an abundant supply of green food, can be expected to give best results. Essentials: Very careful attention to the feeding system, provision of green food, plenty of good drinking water, and a supply of charcoal wood-ashes, bone-meal, or burnt or charred bones. Limewater should be given in the food and a very small percentage of salt added, especially where there is a shortage of green stuff. Compel the animals to take liberal exercise. Keep the boar from the sow until actually ready for mating. The production of small litters may be due to hereditary influences. Boars or sows selected from small litters, no matter how well they may have developed, are likely also in turn to be shy breeders. The boar may be at fault if all the sows are failing to breed well. If only one or two sows are at fault the trouble may be due to some local disease or malformation, or to the sows being overfat or naturally shy breeders and poor milkers. If after altering your system or following up any advice we have given the conditions do not improve, we would suggest cutting out present stock and introducing a boar and sows from another stud where reliable records are kept and where you would have opportunity of selection. Treatment for lice is referred to fully in pamphlets "Administering Medicine to Pigs."

Care of Boar.

G. (Archer, C.Q.)—

It is difficult to diagnose definitely the actual cause of the trouble with your boar. It is probably due to the boar being in an overfat and lethargic condition and to his taking little or no exercise. Try reducing his condition as much as possible and then flushing him with feed for a few weeks as suggested in the leaflet discussing "Flushing the Breeding Sow"; this is sometimes effective. Surgical Supplies Ltd., 246 Queen street, Brisbane, could quote you for drugs aiming at invigorating the genitive organs.

Without inspection it would be quite impossible to decide whether the trouble is due to malformation or to injury, but apparently this is not the case from your description. It sometimes pays to run another young boar in the same run as the older boar with the sows, allowing them all to run together. The boars would probably fight for awhile, but if carefully watched would soon become accustomed to one another. Try a complete change of food for the boar and give him a course of teaspoonful doses of Epsom salts in his food every day for two or three weeks. Give as much green food as possible; compel him to take exercise, and see that he does not have too much grain or fattening foods. Green foods, clean drinking water, and mineral matters are a necessity.

QUEENSLAND SHOW DATES, 1926.

The following is the official list of Queensland Show Dates for 1926, as issued by the Queensland Chamber of Agricultural Societies:—

Redcliffe: 4th and 5th August.

Sunnybank: 7th August.

Royal National: 9th to 14th August.

Crow's Nest: 25th and 26th August.

Coorparoo: 28th August.

Wynnum: 3rd and 4th September.

Imbil: 8th and 9th September.

Zillmere: 11th September.

Gympie: 15th and 16th September.

Beenleigh: 16th and 17th September.

Stephens: 18th September.

Pomona: 22nd and 23rd September.

Malanda: 22nd and 23rd September.

Esk (Camp Drafting): 24th and 25th September.

Melbourne Royal: 16th to 25th September.

Rocklea: 25th September.

Nundah: 1st and 2nd October.

Kenilworth: 7th October.

Southport: 9th October.

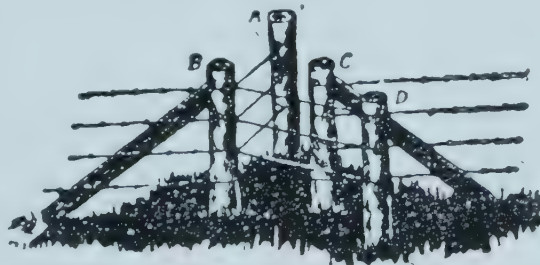
Enoggera: 9th October.

Balmoral: 16th October.

Brookfield: 23rd October.

A GATELESS FENCE OPENING.

In many places it is desirable to have an opening in the fence that a man can easily slip through without bothering with a gate, but through which horses or cows cannot pass. In the arrangement shown in the illustration, four posts are set, as shown. B and C should be braced. One side of the fence is stapled to B, the other to C. Branch wires are also carried from B to A and from B to D. These



NO NEED TO BOTHER WITH A GATE.

should be made of wire without barbs to catch on the clothes, as it is not desirable to make the openings larger than necessary. If B and C are long enough—say, five and a-half or six feet above the ground—they can be braced to each other by a piece of strap iron across the top. If this is possible, then the other braces will not be necessary.—“Country Gentleman.”

General Notes.

Citrus Packing Chart.

The Department of Agriculture and Stock has on hand a few copies of a chart illustrating the best methods of packing citrus fruit for export and the local market. Copies of this chart will be sent, upon prepayment of sixpence to cover packing and postage, to any *bonâ fide* citrus grower who applies for a copy. Only a limited number of copies is available.

Staff Changes and Appointments.

Constables James Rafter and Vincent Joseph Anglim have been appointed Inspectors under and for the purposes of "*The Slaughtering Act of 1898*" as from the 15th June and the 17th June, 1926, respectively.

Senior Sergeant George Sterne has been appointed Acting Inspector of Stock under and for the purposes of "*The Diseases in Stock Act of 1915*" as from the 15th April, 1926.

Music at Paling's for Exhibition Visitors.

Messrs. W. H. Paling and Co., Limited, of 86-88 Queen street, Brisbane, announce that special and adequate provision is being made for the comfortable and congenial accommodation of country visitors interested in music and musical instruments. They have arranged to hold informal Player Piano and Gramophone Recitals during the entire hours of business each day right throughout August. The Gramophone Salons are on the ground floor and the Player Piano Showrooms are located on the first floor. This news will doubtless be much appreciated by many readers, particularly those who propose taking back with them on this occasion something more tangible than the fragrant memories of beautiful music left behind. The instruments to which Palings particularly draw attention are the new "His Master's Voice" Gramophones and the Ronisch Player Pianos. It is claimed that amazing reproductions are derived from those instruments, and that the most critical listener will describe the results as a revelation.

Palings express a sincere wish that their many country visitors shall definitely accept the fact that there is no longer any real reason why they should be deprived of the musical pleasures of the city. A few years back this may have been so in cases where no pianist was available, but now that science and ingenuity have made their Players and Gramophones such wonderful artistic achievements the country home can and should be as cheery and bright a spot as any city home. The appeal of music is irresistible. Palings have requested us to extend through these columns a sincere and cordial invitation to all Brisbane visitors to call at their warehouse. They are assured of a hearty welcome and courteous attention.

Prohibition of Diseased Apple-Trees.

The Minister for Agriculture and Stock (Hon. W. Forgan Smith) stated, in the course of a recent Press announcement, that his attention had been drawn to a news paragraph regarding the prohibition of the introduction into Queensland of young apple-trees bearing symptoms denotive of hairy root or crown gall. The Minister stated that the action of his Border Inspectors was in accordance with a proclamation issued on the 28th April of this year, and which was a repetition of similar proclamations that had been in force for some years past. The existing proclamation provides for a strict prohibition against the introduction into Queensland of any plant affected with symptoms denotive of hairy root or crown gall, and was passed for the protection of apple growers, as experience has conclusively shown that under Queensland conditions young apple-trees affected with the symptoms of these diseases fail to develop, with a resultant total loss of time and energy to the orchardist. Southern nurserymen have been notified each year of Queensland's prohibition against apple-tree stocks so affected, and the Southern Departments were last month asked to warn their nurserymen to take every care to exclude, in parcels for Queensland, trees showing any abnormalities of the roots such as galls or hairy roots. The Department renders every assistance in facilitating the introduction of healthy nursery stock, but, of course, takes every precaution to exclude stock, the growing of which would only result in loss and disappointment to the Queensland orchardist. However, when parcels containing affected trees are inspected at the Border the nurseryman has the privilege of arranging for the picking over of the bundle so that the healthy plants may go forward to their destination.

Export of Opossum Skins.

Further regulations have been issued under the Animals and Birds Acts dealing with the disposal of opossum skins overseas and the payment of royalty on overseas consignments.

The English Egg Market.

Foreign eggs numbering about 2,500,000,000 are imported into Britain every year, and it is probable that before long each egg, as well as many other varieties of imported produce, will be required by law to be marked with their source of origin. Denmark is a sort of universal breakfast provider, and alone supplies Britain with bacon, butter, and eggs to the value of £45,000,000 in the year. Danish farmers believe that compulsory marking will be to their advantage. They claim that the average weight of their eggs per 120 is 17 lb., whereas the average for British is 15 lb. They say, also, that with their organisations for collecting and marketing, Danish eggs can be and are sold in the large cities of Britain within three days of their being laid, or less than the average age of the retailed home-produced new-laid egg.

The Live Stock of the State.

The Registrar-General (Mr. George Porter) has supplied the subjoined preliminary statement showing the number of live stock in the State on 1st January, 1926, together with the increase or decrease on last year's figures:—

RETURN OF LIVE STOCK IN QUEENSLAND ON 1ST JANUARY, 1926.

	Horses.	Cattle.	Sheep.
Preliminary (1st January, 1926)	624,243	6,441,223	19,186,516
Actual (1st January, 1925) ..	660,093	6,454,653	19,028,252
Increase			158,264
Decrease	35,850	13,430	

Several returns are outstanding which when received may alter the decrease in horses and cattle.

The Dairy Cow.

“Feed is the source of milk, and the consumption of a large amount of feed on the part of the cow is highly essential,” writes Professor G. C. Humphrey, Department of Animal Husbandry, University of Wisconsin. “A large body, more especially the barrel, in proportion to the size of the animal, indicates feed capacity. The deeper the cow is at the rear parts of her barrel, the wider she is between the hip points, and the greater the width at the points of the shoulders the greater will be her capacity for feed. Ribs that are well sprung and far apart, a chine that is open, a back that is wide over the loins, and a depression between the last rib and the hip point that is large, are all evidences of good feed capacity. A correlation may be established between the width of the forehead and the width of the body; between a comparatively long face and a good length of body; and between a broad muzzle, good-sized mouth, and long sinewy jaws, and a good feeder. These points may therefore be associated with feed capacity.”

University Degree for Dairying.

Professor H. A. D. Neville, Dean of Faculty of Agriculture at the newly-chartered University of Reading, announces that a degree course in dairying—the first of its type in England—will be instituted at the beginning of next session.

“The importance of milk and its by-products as staple foods, and the growing demand for and increasing supply of clean milk,” Professor Neville says, “necessitate the employment of a large number of highly-skilled scientific men and women whose training has accustomed them to the problems of dairying, and this degree course will fill the gap. Dairying is no longer a third-rate trade, but an important profession.”

The course, open to all matriculated students (men and women), will be of three years' duration. Successful students will receive the degree of B.Sc. (Dairying). The details of the course have yet to be passed by the Senate of the University, but the general lines have been decided on.

The first year will be devoted to pure science, including chemistry, botany, zoology, and another subject, the most favoured being physics. The second year will embrace the subjects of dairying, including building construction, live stock, and dairy farming, bacteriology, mycology, and practical dairy farm work. The final year will be devoted to dairying generally, including dairy hygiene and legislation, and advanced science.

Levy Regulations.

Regulations have been issued under the Primary Producers' Organisation Acts empowering the Council of Agriculture to make levies for the year ending 30th June, 1927, on all agricultural and pastoral industries except grazing. These regulations are practically the same as those for the year that has just ended.

The general levy to be made for the year ending 30th June, 1927, has been based on an estimate to yield a sum not exceeding £21,000.

The Preservation of Eggs.

The good housewife can be relied upon to realise the importance of the following advice on the subject of pickling eggs. A lime pickle recommended by the Ministry of Agriculture (U.K.) consists of four parts by measure of finely-slaked lime, with twenty parts of cold water, and the subsequent addition of one part of salt. This solution is prepared by first mixing the lime and the water, and thoroughly stirring daily for a week. The salt is added on the fourth day, and at the end of the week the clear solution is poured off for use, leaving the sediment. Waterglass (silicate of soda in solution) is obtainable in different strengths, which should be ascertained at the time of purchase in order that it may be diluted sufficiently by the addition of boiling water to bring the mixture to the proper proportions. Experiment has shown that while a 5 per cent. solution may be used, a 3 per cent. solution is sufficient to ensure good results.

Eggs for pickling should be produced by healthy stock, should be infertile, clean, free from cracks or blemishes, and absolutely new laid. It is desirable to make frequent collections from the nests to avoid soiling, to cool the eggs if still warm, but to immerse them in the solution without undue delay and without exposure to heat or storage in a draughty place. It is better to test any eggs about which there may be the slightest doubt. If the conditions are correct, and the eggs are covered by the solution, they will keep for six months, or longer if necessary. If sold at the end of the pickling period they must be properly described as "preserved eggs."

Selecting a Tank Site.

Very careful consideration should be given to the selection of a site for a tank.

The most important point is a good catchment, and this, on some holdings, is almost the sole determining factor. In undulating country catchments are generally good, and no difficulty is experienced, but in the level country of the western plains a new settler would do well to secure the advice of a more experienced man. Very often shallow watercourses exist, and the tank should be located on or near these. Roads provide good catchments, and a good flow of water can be obtained off the hard, bare patches which exist on the plains. In selecting catchments attention should also be given to the nature of the country; for instance, a drain running over hard, compact soil will carry more water into the tank than one running over black soil, which develops large cracks during drought periods, and which absorbs a large amount of water before any reaches the tank.

Although the experience of old settlers is of great value, even they make mistakes sometimes. Land often appears level when it has a fall of several inches, and in very level country it is often well worth while to have levels taken before fixing the site.

While preference must be given to the catchment, it is important that the tank should be located in a central position to save the stock from much travelling to and from water. If possible, the site should be near a belt of green timber, as stock come to water in the morning and like to linger around in the shade, taking frequent drinks before moving off in the afternoon. If shade is not available they probably take only one drink in the day, and consequently do not do as well as they otherwise would.

After locating what is apparently a good site, the nature of the soil should be ascertained. On some country a tank will hold well almost anywhere, but in other classes of soil some considerable difficulty is experienced, and recourse must be made in some cases to puddling. The nature of the timber is usually indicative of the character of the subsoil, but it is not always reliable. Occasionally the country is patchy; while the subsoil in portion of the tank is good, a band of a porous character may be struck which will cause a leakage. Before sinking is commenced trial shafts should be sunk to the depth it is proposed to excavate the tank, and if it is considered the country is patchy two or three should be put down. An experienced man can tell by the nature of the subsoil whether or not it will be "good holding," but if there is any doubt a test should be made by partly filling the shaft with water, so that its holding capacity can be ascertained.

The Royal Society of Queensland.

At the last ordinary monthly meeting of the Society in the Geology Lecture Theatre of the University the President, Dr. J. V. Duhig, M.B., was in the chair. Mr. W. D. Francis read a paper entitled "The Development of the Corrugated Stems of Some Eastern Australian Trees." Two classes of corrugated stems are recognised: fluted or grooved stems (exemplified by *Villarsia Moorei*), and wrinkled or finely corrugated woody cylinders (exemplified by *Arytera Lautereri*). The development of the stems of these two species and the anatomy of the wood connected with the grooves and wrinkles are described and illustrated. In addition, the anatomy of the wood associated with the wrinkled woody cylinders of *Sarcopharyx stipitata*, *Cryptocarya corrugata*, *Canthium latifolium*, and *Casuarina inophloia* is described and illustrated. Messrs. H. Tryon and D. A. Herbert commented upon the paper.

Mr. E. Ballard, B.A., delivered a lecture on "A Journey Up the Markham Valley, New Guinea." The head waters of the Markham and its tributaries are little known. The floor of the valley slopes gently to the west, and rises gradually from sea-level to an elevation of 1,250 feet. The valley about half way up changes direction abruptly through a few degrees, and runs rather more northerly than north-westerly. It is generally supposed that the Markham Valley owes its origin to a fault, and that at one time the Huon Peninsula was an island. During this time the sandstones and conglomerates which form the foothills of the valley were formed. The subsequent uplift was very rapid, and the valley passed from sea strait to estuary to its present status of a valley. Messrs. C. T. White, B. Dunstan, C. Massey, H. Tryon, H. A. Longman, E. W. Buhot, and Dr. E. O. Marks took part in the discussion on the lecture.

Dr. W. H. Bryan exhibited a specimen of green banded jasper containing remains of radiolaria from New England, New South Wales. Mr. H. Tryon commented upon the exhibit.

The Australian Dairy Council—Minister's Reply to Criticism.

The Minister for Agriculture (Hon. W. Forgan Smith), at the request and on behalf of the Ministers of Agriculture attending the recent Interstate Ministerial Conference, said, in the course of a Press statement, that they regretted that Mr. Rankin, of the Australian Dairy Council, had seen fit to again raise the question of the attitude of the Ministers to the proposals of the Dairy Council. Not only did Mr. Rankin not touch on the real point at issue—namely, the line of demarcation between the functions of the Dairy Council and the State Departments of Agriculture—but with the apparent object of clouding the issue had resorted to quoting only such portions of the 1922 Agreement or Constitution as appeared to suit his (Mr. Rankin's) purpose, and to suppressing the vital paragraphs which would have clearly shown how untenable was the position taken up by the Dairy Council. The so-called Constitution shows very clearly that the main functions of the Council pertain to marketing legislation, grading, and standards of quality as applied to dairy produce for export. This is emphasised by Mr. Rankin in the official report of the Council's operations issued last November, wherein he says that "the functions of the Australian Dairy Council include (a) To advise Federal and State Ministers in regard to administration of Acts and Regulations pertaining to the export of dairy produce, the standards of quality and composition of such produce, and the conditions under which an Australian brand denoting standard quality shall be applied; and (b) to secure uniform legislation and administration in all States." In this same report Mr. Rankin says that the scheme provides that all matters pertaining to production, manufacture of, and instruction relating to dairy produce are the definite functions of the State Governments. Mr. Rankin's own report showed that the 1922 conference laid down a definite line of demarcation between what was regarded as the legitimate functions of the Commonwealth and States in respect to the dairying industry. Unfortunately, however, persistent efforts had been made by a section of those interested to encroach on what were definitely laid down as functions of the State. Mr. Rankin says the proposals of the Council were in many ways misconstrued by State Ministers—a ridiculous statement to make in view of the very clear and definite statement that the Council was the proper body to co-ordinate the work throughout the various States in respect to improvement of production and the further proposal to appoint a special staff, presumably under the direction of the Dairy Council, to carry out these operations. What gives the members of the Dairy Council concern is that the Ministers understood and appreciated only too well what these proposals really meant. Mr. Forgan Smith added that Ministers regretted the necessity for joining issue with Mr. Rankin on the subject, but felt that it was their duty to set out in very definite terms their determination not to permit the Council to encroach on the functions which belong to the States, and which can be much more effectively and economically carried out by the trained staffs of their respective Agricultural Departments.

Milk and Minerals.

The recent revelation that Lord Astor's racehorses, which have been so successful on the course, are reared at Taplow, where the pasture is rich in minerals, has brought home to popular imagination the value of minerals in body-building.

Proteins, "energy value," and vitamins have engaged the public imagination so thoroughly that the importance of mineral constituents has been neglected; yet these are, in truth, the bricks with which young and old build up and repair their staying power, writes a medical correspondent of the "Portsmouth News."

There are ten mineral elements in the body essential as constructive material for growth. They are constantly being lost in the general wastage of the body, and they must be replaced. Their absence is well advertised by ill-health and poor condition.

The chief minerals demanded by the human body are lime (calcium) and various phosphates. Scientists have worked out tables of the contents of various foods, and so there is no difficulty in discovering if we are "starved." Wheat, bread, and potatoes are badly lacking in mineral constituents, but milk, cheese, and green vegetables are well supplied. We have the assurance of no less an authority than Professor Mottram, of London University, that if we take sufficient of these foods there is no danger of our being starved of lime and phosphates.

Milk is recommended as a staple in all diets, for, apart from supplying minerals, it is rich in fats and other essentials. Captain Elliot, Parliamentary Under Secretary of Health for Scotland, lecturing recently in Glasgow, took a step forward in emphasising the importance of mineral qualities in pastures for milk cows. He may rest assured that farmers will not be slow in devoting attention to such factors. Not only is the food of cows receiving careful scrutiny, but the milk itself is treated with scrupulous care. And so, despite all the new fads and fashions in diet, milk, the most primitive and natural, still stands unchallenged as Nature's well-nigh perfect food.—"The Dairy."

Crops Suitable for Silage.

To make good silage, it is essential that the material used should contain the right amount of sap. If it is too dry, it is likely to mould or char—that is, the heat generated, although not causing actual burning, will produce a charred condition of the material and render it useless. If, on the other hand, it contains too much sap, a mushy, evil-smelling product will be produced, which in some cases will be quite valueless.

While many crops can be used for filling the silo, the most suitable in regard to feeding value and ease of handling are maize, sorghum, Sudan grass, wheat, oats, and barley. In the coastal districts maize and sorghum are undoubtedly the best, as they give a big yield per acre, and are very easily converted into silage. Maize is the better of the two, being less subject to disease and producing fodder of higher quality. As a rule, the best crops for inland districts are wheat, oats, and barley, although in some localities, particularly in the north-west, maize is quite satisfactory. On the whole, however, for western districts preference may be given to the winter cereals, as the yield is more certain. There is not the slightest difficulty about making silage from any of these crops, provided the silo is of the right type, and the crop is cut at the right stage, and also that it is put into the silo immediately, and is well packed down during the process.

Black oats cut before the seed is formed makes splendid silage, so that it is possible for a farmer to clean his land and to conserve useful feed at the same time. Among natural herbage, trefoil and variegated thistles make good silage, but it is as well to let the material wilt a few days before putting it into the pits. It is doubtful whether very succulent herbage, such as crowfoot will make good silage. It contains so much sap that it would be risky, though if it were allowed to dry somewhat and could be mixed with drier material, it might turn out satisfactorily.

Rape cannot be converted into silage, owing to its excessive sappiness. Even stray plants of rape mixed with barley put into the silage pit at Coonamble Experiment Farm came out mushy and useless. Dry material, such as many western grasses when in flower, cannot be used, and it is not possible to utilise such weeds as star thistle, black thistle, &c.

To produce good silage the crops should be cut when they contain the maximum food nutrients in a condition that will make good silage.

Maize should be cut when the grain is glazed or well-dented, the lower leaves on the stalk yellowing, but the stalk itself full of sap. At this stage it will contain maximum food value, and at the same time sufficient moisture to pack well in the silo.

Sorghum should be cut when the heads are reaching maturity, and the seeds so hard that they are crushed between the finger and thumb with difficulty. Sudan grass should be cut when the seed is formed but is still in the milk stage.

Wheat, oats, and barley should be cut just after the ears are well out. Many farmers before cutting these crops for hay wait until the grain is well formed and the straw has become somewhat dry. Crops intended for silage should not be allowed to reach this stage, as plenty of sap is required in the plant to ensure a good product when the silo is opened up.

Maize and sorghum can be cut with the least labour with the maize harvester, but where that implement is not available, cane knives, short hoes, reaping hooks, or scrub scythes may be used. A slide fitted with a scrub scythe blade, and drawn by a horse, is used by some farmers.

Wheat, oats, and barley are cut with the reaper and binder.

Unlike hay, silage may be made at any time, irrespective of the weather. Rain causes inconvenience, but it need not delay the work.—A. and P. Notes, N.S.W. Department of Agriculture.

Peanut Production

Like all other cultivated crops, the peanut will readily respond to good cultivation; in fact, good cultivation is one of the essentials to success.

On typical peanut land, which is of a light friable nature, the preparation is comparatively easy, and beyond early ploughing and good cultivation no special preparation is required. The initial preparation of the land will be governed to some extent by the previous crop, but if possible it should be fallowed during the winter months so that at least a portion of the winter rains may be conserved. In some quarters, the value of even a short fallow is not fully recognised, for, apart from the fact that the moisture-holding capacity of the soil is increased, there are other important items that should not be overlooked. In districts of a good rainfall these may play an equally important part with the conservation of moisture. When the land is ploughed and allowed to stand for some time, the aeration results in a sweetening and enriching of the soil, due to the decay of organic matter and the action of frosts, rain, wind, &c. This results in the liberation of inert plant-food in a form in which it is more easily assimilated by the plant.

The disposal of all residues and weeds from the previous crop by decomposition is of importance, for it is necessary that the land be free from all such trash when the crop is planted, otherwise cultivation of the growing crop is rendered much more difficult, and the plant does not have the same opportunity of pegging freely.

A deep ploughing should be given during the winter as soon as practicable after the removal of the previous crop, and the land should then be allowed to lie in the rough until heavy rains fall, when it may be harrowed to stop evaporation and kill young weed growth. It is generally advisable to follow up with a shallow cross-ploughing or disc-cultivation from four to six weeks previous to sowing. From thence onwards until planting, every effort should be made to keep the surface soil in a medium fine, mellow, friable condition, to conserve moisture, and to induce the germination of weeds so that they may be killed by further cultivations. In average seasons the free use of the harrows will do all the work that is necessary, although if this does not prove effective the spring-tooth or disc cultivator may be used to advantage.

Peanuts should not be planted on the same land two years in succession, and to obtain best results one crop every two to three years is sufficient. If possible, the peanut should follow some cleaning crop, such as potatoes, cotton, or a summer fodder crop. When they are preceded by maize, early ploughing is essential so that the maize stalks and other residues may have time to decay before planting. Sweet potatoes are often grown on land suitable to peanuts, but on no account should peanuts follow this crop, for a good deal of trouble will be met with owing to the continuous sprouting of self-sown roots.

The principal points to be aimed at in cultivation are:—

- (1) *Early preparation*, so that the moisture may be conserved and the decay of the residues from the previous crop encouraged.
- (2) *Freedom from weeds*.—If planting is carried out in a dirty seed-bed, a considerable amount of trouble will be experienced in after-cultivation and chipping, which is expensive, and reduced yields will result.
- (3) *Loose, fine, friable surface*, so as to ensure a good germination, without which a profitable crop cannot be obtained, and conditions favourable for the flower stalks to penetrate the soil easily and thus encourage a rapid development of the nuts.

Woman—The Pioneer.

“Man in the dawn of history was a thinker, and nothing else. Woman was always a worker.”

THE FIRST ARCHITECT.

The Cave Man and his Woman, with their offspring, are travelling along the banks of a river. The woman, thinking of the babe, begins to wonder where they will shelter for the night. The river bank appears a very desirable place—so the man and woman, after talking things over, decide to stay there for a while. But there is no cave to serve as a home—what matter? She looks round at the tall reeds on the river bank—her man has the skins of wild beasts that he has slain—in a flash, a picture of a “home” stands out, completed in all its details.

So she plaits the reeds and strong thick grasses together for the walls, lays on top the crossed boughs of trees, and roofs it with the skins. When she has scraped up the earth to make a sheltering wall all around it, she has designed and built the first house.

THE FIRST CUTLER AND TANNER.

Next day, looking out, she sees her man striding along beside the river with a deer which he has killed hanging over his shoulder.

When he reaches “home” he throws it at his wife’s feet. He then goes off to the shelter of the hills and, stretching himself on the soft turf, falls asleep. And while he dreams, and the baby whimpers, the mother sets to work on the deer. She strikes off a sharp flake of flint for a knife—by this act becoming the first cutler (the real “founder” of Sheffield). With this knife she carefully removes the skin, rolls up the hide, smokes it, curries it, breaks it with implements of stone and bone, and thereby becomes the first currier and tanner.

THE FIRST TAILOR AND DRESSMAKER.

Her fingers are very weary with her hard toil, but she has much yet to accomplish. Her poor tools are a needle of bone, a thread of sinew, and scissors of flint. There is no sign over the door, but in that primitive workshop the first tailor and dressmaker cuts and sews and makes the clothing for her lord and her family. Presently, she will stop sewing to cook the family dinner, after which the man sets off again (this time it may be to spear fish for a change); and then the busy wife and mother gets her work out again, for then, as now, “woman’s work is never done.”

THE FIRST DECORATIVE ARTIST.

This time, it is a different kind of work. She is going to make mats and screens, baskets, and sails for her man’s boat. Very skilfully with her fish-bone needle she binds together the rushes and reeds and grasses that she has gathered on the river banks.

As she works with the baby asleep at her feet, it occurs to her that her toil is very monotonous. So, half absent-mindedly, she tries to arrange the different coloured grasses in some sort of pattern. Then she goes a little further—why not make some of the stitches different too, as well as the colours? So the first “chevrons” and “herringbones” are invented. And the first decorative artist was born, because of a woman’s desire to vary the monotony of her day’s work.

THE FIRST NURSERYMAN.

Then comes a day when, with one of her finished baskets strapped across her forehead, she goes off to the fields. With her “spade,” which is a sharp, pointed stick, she digs up the roots from the earth, clears away the weeds from the plants which she has found are good to eat for food, and makes holes in the ground for the seeds she has carried in the basket.

Then “home” she comes with her basket again loaded—this time with acorns and various roots, which she crushes and rolls on a stone slab, and so becomes, as well as the first nurseryman, the “first miller.”

And now Man has taken over this wonderful kingdom founded by Woman.

He has carried the inventions that she gave him to perfection.

The digging stick has become a plough.

The basket carrying the seeds for sowing and the roots for milling has become the railway train.

The stone crushing slab has become the roller mill.

The stone scraper for softening hides has become the tannery.

The world is often in danger of forgetting the debt it owes to woman—the discoverer of “arts and crafts,”—“Vailima,” in “Maoriland Worker.”

The Guernsey Cow.

Lord Poltimore contributes an interesting article on "The Guernsey Cow" to the fourth official handbook and work of reference for 1926, of the East Devon Milk Recording Society.

It is often said of a Guernsey that she is "a rich man's cow," he writes. No! she is everyone's cow—be he a wealthy private individual, a big dairy farmer, or a small holder; in fact, she is particularly suited for the purposes of the latter in view of her invaluable dairy qualities, her docile disposition, and because she is naturally a very close grazer—a quality which she has inherited from her progenitors' method of existence for many generations in their native island.

Dealing with the history of the Guernsey, Lord Poltimore says it is evident that this cow was evolved with a view to—(1) A hard and thrifty constitution; (2) economic production of milk and butter.

"It used to be, and sometimes is still, asserted that Guernsey cattle are delicate. This is indeed a fallacy. On our own farm, situated on the very borders of Exmoor, 800 feet above sea-level, he adds, we have now kept Guernsey cattle for over seven years, and our experience has always been that the Guernsey will stand the almost unceasing wet weather—and cold wet, too—of which we receive more than our share, and will thrive on our bleak upland pastures infinitely better than will the heavier breeds of dairy cattle. I may add that this is also the experience of others who keep Guernseys in this district.

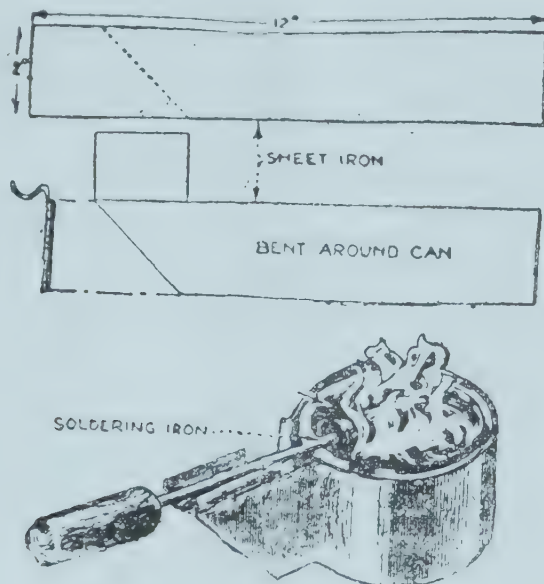
"Besides being of good constitution, the Guernsey is an exceptionally economical producer of rich milk and butter; in fact, you will obtain more milk and butter from a Guernsey in proportion to the food you put into her than from any other breed of cow.

"Do not get your Guernseys too fat, for a Guernsey, if wastefully fed for dairy purposes, will put on fat at an amazing rate; in fact, it is only the prejudice of the public against the yellow fat which prevents Guernsey beef from being more often seen in the butchers' shops. To overfeed a Guernsey is to ruin her.

"Some interesting statistics are given, and, alluding to milk recording, Lord Poltimore expresses the opinion that it is a grievous policy to attempt to force a cow beyond the 1,000-gallon limit."

HEATING AN IRON.

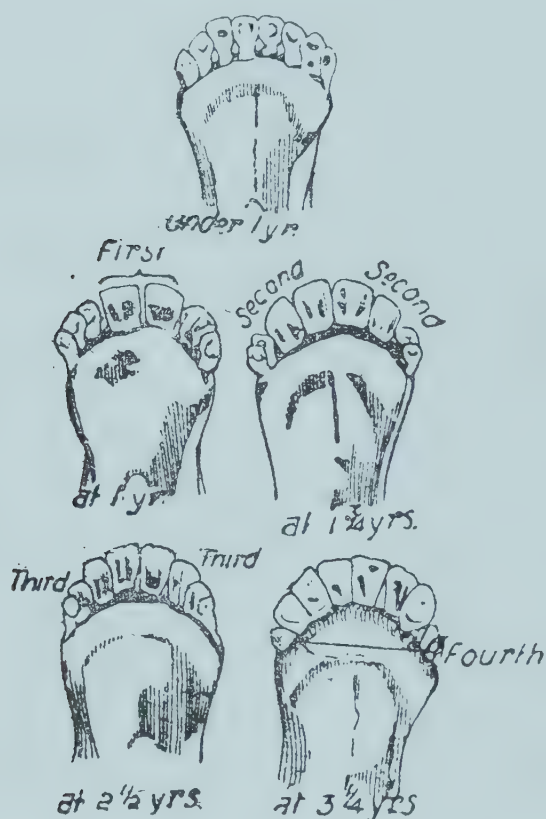
The illustration taken from "Popular Mechanics" shows how a small soldering iron may be quickly and conveniently heated. A sheet-iron stove, made as shown in the illustration, will give good results in heating a soldering-iron with sawdust soaked in methylated spirit as fuel. In the latter case a seamless can with a friction top should be used as a container for the sawdust, to prevent evaporation



of the alcohol and to provide a method of readily extinguishing the flame, which can be snuffed out instantly by replacing the cover. A sheet of asbestos, or an asbestos flatiron pad, should be placed underneath the stove to prevent burning the bench top. The pattern above the drawing shows the dimensions and the points where the sheet metal is bent.

DENTITION OF SHEEP.

A western district landowner, with little experience of sheep, has made some inquiries about the determination of ages, which is a most important matter in sheep keeping. Opportunely there is reproduced in the "Journal of Agriculture," Western Australia, diagrams showing the position of incisors by which the age is reckoned. Sheep have 32 teeth, eight incisors situated in the front of the lower jaw, and six molars or grinders on each side of both jaws. At birth a lamb possesses two temporary central incisors, and at the end of four weeks all eight temporary incisors are up with the three molars in each of the upper and lower jaws (first, second, and third, temporary molars). At three months the fourth molar is cut and is permanent. At the ninth month the fifth molar is seen. At eighteen months the sixth permanent molar is cut. The third temporary molar covers the top of the permanent molar, while the first and second permanent molars push off the temporary ones. Thus a sheep has all its permanent molars at from eighteen months to two years old. The



molar teeth are for masticating food, the surfaces being irregular and suitable for grinding. With the incisors, the first two or central permanent teeth make their appearance at from twelve months to fifteen months. The sheep is then known as a two-tooth or hogget. At about two years of age, the two temporary incisors on either side of the central teeth are replaced by two permanent teeth, when the sheep becomes a four-tooth. At about three years of age, two more permanent teeth make their appearance, and the sheep is a six-tooth. At four years of age two more teeth appear, and the sheep is full-mouthed. From about five years the central teeth show signs of separating in the middle, and as the sheep becomes older the other teeth will separate and may become broken. With age the teeth become worn down or lost and the sheep is said to be broken-mouthed. It is wise if only three or four teeth are left to pull them out and leave the sheep a gummy, as they will do better.—"Australasian."

Farm and Garden Notes for September.

With the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight, they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of sub-surface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghums, melons, pumpkins, cowpeas, broom millets, and crops of a like nature, provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, it is necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, paspalum may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimising the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place prior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts, plant sweet potatoes arrowroot sugar-cane, and cow cane (preferably the 90-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the liquid form for preference. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft.

apart. Plant out tomatoes $3\frac{1}{2}$ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinnach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohlrabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

Orchard Notes for September.

THE COASTAL DISTRICTS.

September is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blossoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as, if the trees are not in this condition, they do not possess the necessary strength to set their fruit, even though they may blossom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the tree; and, secondly, that there is an adequate supply of the essential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by deep and systematic cultivation, excepting in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficient plant-food—a condition that is easily known by the colour of the foliage and their weakly growth—the orchard should be manured with a quick-acting, complete manure; such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the above has been written mainly in respect to citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant-food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug, and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Take great care in the selection of the suckers, and see that they are free from beetle borers or other diseases.

As a precaution it is advisable to cut off all old roots and to dip the corms for two hours in a solution of corrosive sublimate, made by dissolving 1 oz. of this substance in 6 gallons of water.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers.

When necessary, manure—using a complete fertiliser rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash, 1 of the former to 1 of the latter.

Pineapples can also be planted now. The ground should be thoroughly prepared—viz., brought into a state of perfect tilth to a depth of at least 1 ft., more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure, which should, however, contain no superphosphate.

Old plantations should be kept in a good state of tilth and be manured with a complete fertiliser in which the phosphoric acid is in the form of bones, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of eustard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable passion vines can also be pruned now, as if cut back hard they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grapes vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed from then till the time the fruit is ready to colour with Bordeaux mixture, in order to prevent loss by downy mildew or anthracnose.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Where not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphid should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop. Woolly aphid should also be systematically fought wherever present, as once the trees are in leaf it is much more difficult to treat.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

Grape vines should be swabbed with the sulphuric acid solution, mentioned in the Notes for August, when the buds begin to swell and just before they burst, as a protection against black spot and downy mildew.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in Bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit-fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.						
AT WARWICK.						
MOONRISE.						
1926	JULY.		AUGUST.		JULY.	AUGUST
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.46	5.6	6.36	5.20	p.m. 10.57	a.m. nil
2	6.46	5.6	6.35	5.21	11.57	12.51
3	6.46	5.6	6.34	5.22	nil a.m. 12.58	1.50
4	6.46	5.6	6.34	5.22	12.58	2.48
5	6.46	5.6	6.33	5.23	1.58	3.45
6	6.46	5.7	6.33	5.23	2.56	4.37
7	6.46	5.7	6.32	5.23	3.56	5.26
8	6.46	5.8	6.31	5.24	4.53	6.11
9	6.45	5.8	6.31	5.24	5.48	6.53
10	6.45	5.9	6.30	5.24	6.41	7.29
11	6.45	5.10	6.29	5.25	7.27	8.5
12	6.44	5.11	6.28	5.26	8.14	8.37
13	6.44	5.12	6.27	5.27	9.5	9.8
14	6.44	5.12	6.26	5.28	9.29	9.40
15	6.44	5.12	6.25	5.29	10.4	10.13
16	6.43	5.12	6.25	5.29	10.36	10.47
17	6.43	5.13	6.24	5.30	11.6	11.24
18	6.43	5.13	6.23	5.30	p.m. 11.40 12.18	p.m. 12.18
19	6.43	5.13	6.22	5.31	p.m. 12.14	12.58
20	6.43	5.13	6.21	5.31	12.51	1.53
21	6.42	5.14	6.21	5.31	1.32	2.6
22	6.42	5.14	6.20	5.32	2.40	4.3
23	6.42	5.15	6.20	5.32	3.14	5.14
24	6.41	5.15	6.19	5.32	4.15	6.23
25	6.41	5.16	6.18	5.32	5.21	7.31
26	6.40	5.17	6.16	5.33	6.29	8.35
27	6.40	5.17	6.14	5.33	7.36	9.38
28	6.39	5.18	6.13	5.34	8.44	10.42
29	6.38	5.18	6.11	5.34	9.51	11.43
30	6.37	5.19	6.10	5.35	10.51	nil a.m.
31	6.37	5.20	6.9	5.35	11.51	12.42

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

- 1 August) Last Quarter 5 24 a.m.
- 8 " ● New Moon 11 48 p.m.
- 17 " « First Quarter 2 38 a.m.
- 23 " ○ Full Moon 10 37 p.m.
- 30 " » Last Quarter 2 40 p.m.

The conjunction of Venus with the moon on the 6th at 12.5 p.m. should form an interesting spectacle, although the nearness of the sun on the right will detract largely from the beauty of the phenomenon. Venus will appear to be remarkably close to the moon, less than half its diameter above it, and should be observable to the naked eye if due precaution is taken to screen off the sun.

At midnight on the 7th Mercury will be in inferior conjunction with the sun—that is in the part of its orbit which is nearest to the earth.

Saturn will be in conjunction with the moon on the 16th at 7.25 p.m.

Jupiter will be in conjunction with the moon on the 23rd at 8.32 a.m., when it will be four diameters of the moon north of it.

The star Upsilon Aquarii will be occulted by the moon a little before 10.30 p.m. on the 24th. As the moon will be nearly full a pair of binoculars or a telescope will be necessary in order to detect this small star of magnitude 4, 5.

Mercury will be at its greatest elongation (18 degrees 20 minutes) west of the sun on the 25th, and will therefore be visible near the eastern horizon about an hour before sunrise.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

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PART 3.

Event and Comment.

The Current Issue.

A notable feature of this issue is a valuable contribution, which has also been published in pamphlet form, on Stock Foods, by Mr. Brännich. The Royal National Show at Brisbane is well covered, and departmental activities in relation thereto are excellently illustrated and comprehensively reviewed. Mr. Shelton discusses the exhibit and awards in the Pig Section. An award list in detail, which is of particular interest to farmers, has been held over on account of pressure on space for the October issue. Included among selected matter is an article on Meteorology in Agriculture, which is of particular interest at the present time. In addition, usual Journal features are well presented.

The Brisbane Exhibition.

The Royal National Association demonstrated fully its mission as an educative force at its Annual August Show, which was a pretty fair indication of our agricultural health and rural wealth. Ring entries were well up to the standard attained in former years, and were a good guide as to the progress we have made in the industries from which Queensland draws its life-blood. The animals paraded must surely leave their impress on Queensland's flocks and herds; they provided convincing evidence of the advance we have made in scientific stock-breeding. Few onlookers realise the years of patient effort by breeders that enables them to present such fine stock types for judgment. The prize-winning stock on parade—particularly the numbers and quality of those in the Dairy Division—made a most impressive sight. The Royal National Society is doing great work for the State, and in the variety, quality, and number of exhibits this year's show was one of its greatest successes.

Agriculture in Queensland—The Year's Review.

Agriculture in Queensland during the year ended 30th June last is exhaustively reviewed in the annual report of the Department of Agriculture and Stock. The report deals with several departments of production, and stresses the fact that the year generally was marked by abnormal dryness. The price paid for last season's wheat, just over 6s. a bushel, had induced the preparation this year of a larger acreage. It was expected that the area cropped would constitute a record. Since sowing, however, the rainfall in the wheat belt had not been heavy enough to promote a satisfactory general germination, and in some localities heavy frosts proved a retarding factor. Good general soaking rains were needed to establish the crop and ensure a satisfactory harvest.

The 1925 wheat crop returned in the aggregate, omitting grain retained for seed and farm feed, 1,799,263 bushels. Yields were irregular in some districts, notably in Maranoa and Inglewood. In some instances on the heavier soils, through ineffective germination, an odd failure was reported. On the Darling Downs, where most of the wheat was produced, the average yield was reduced by insufficient rain and late frosts.

Progress in the Sugar Industry.

The sugar industry in Queensland had made enormous progress in recent years, the report continued, and last year the highest yield of sugar was produced—viz., 485,585 tons of 94 net titre. The tonnage of cane grown was 3,668,252. This was largely due to the remarkable expansion which took place in the growing of sugar during the past five years, combined with a particularly good season in 1925. The area under cane last year was approximately 268,500 acres, which carried over 6,000 growers. Of this great area about 180,000 acres were crushed. The number of acres returned for 1925 as being under cane had increased by over 100,000 acres since 1921. The average and approximate yield of cane was high—viz., 20.38—while the yield of sugar was the best on record, being in the region of 2.70 tons per acre, the highest yield so far in the history of cane-growing in Queensland.

Favourable Market for Maize.

An extraordinary demand for grain for feeding stock in dry areas concurrently with a reduction in yield of the 1925-26 crop created a very favourable market for maize. Most of the big maize-producing provinces suffered from rain deficiency, and yields were much below normal. Light crops resulted from early plantings, but the main crop more or less failed. In contrast, the maize-growing tract on the Atherton Tableland enjoyed one of its best seasons, and more than 20,000 tons of good quality grain was the estimated yield.

Peanut Production.

Continuing, the report states that peanut production was becoming a staple and stabilised crop, particularly in the Kingaroy district. Last year, with the assistance of the Department, a shelling machine was installed by the Peanut Pool Board, whose base is at Kingaroy. Up till then the crop was marketed in the pod and, although the grower got some return, the profit went elsewhere. The fact that in 1924-25 only 691 acres were cropped for peanuts in the whole of the State, and that in the following year 3,000 acres were cropped in the Kingaroy district alone, showed how this minor industry had expanded. On present reports there is a probability this year of the area under peanuts in the South Burnett being extended to 10,000 acres.

The Dairying Industry—High Quality of Queensland Butter.

Favourable seasonal conditions governed the industry in the early part of the year, but the prevailing dry spell in the second half of the term was responsible for a diminution in production. Figures for the year show that 60,496,753 lb. of butter,

12,515,895 lb. of cheese, and 9,771,763 lb. of condensed milk were manufactured. First-grade butter attained a higher average quality and uniformity. The general high quality of Queensland butter was the subject of favourable comment and commendation of the experts appointed to judge the entries at the world's butter test in New Zealand. Second place in the test was gained by the Oakey District Co-operative Dairy Company, with only half a point lower than the winning competitor—a New Zealand company. An increase in the quantity of second-grade butter was attributable to unfavourable climatic conditions during the high-production period. The activities of the several commodity boards operating under the Primary Products Pools Acts had benefited the dairying industry very considerably. Marketing had been co-ordinated throughout the State, and a more orderly system evolved. The Paterson (Delroy) price stabilising scheme had had a beneficial influence on interstate markets. The adoption of an all-Australian brand for high-grade butter exports had also had an influence in enhancing oversea prices.

Progress in Pig-raising.

The year generally was not a good one for the pig-raiser. The growth of grain, green, and root crops was restricted by unfavourable meteorological conditions. Where the season was good, as at Atherton, marked progress was observed in the industry. Largely through the continuous efforts of the Department, a considerable improvement in the quality and condition of stock received at the curing and canning factories was noted, though there was still room for improvement.

Poultry Keeping.

The importance of poultry-raising was being more widely appreciated. Increasing annual export values indicated what was possible by a further development of oversea trade in poultry products. When eggs had been properly graded and packed, the experience of the trade had been encouraging. Practical interest in the industry was increasing, and many farmers were now including poultry-raising in the general range of their activities.

Cotton Yields and Cultural Methods.

The cotton industry had been affected by the abnormal dryness of the season. In consequence, the total yield for the whole State was below earlier seasonal estimates, and considerably below the 12,000-bale crop ginned last year. By 5th June only 5,147 bales, averaging 481 lb. each, had passed through the gins. Prospective later receivals indicated only a slight augmentation of this total. These figures, however, did not represent a lower yield per acre. Seed for a 40,000-acre planting was applied for, but it is doubtful if 25,000 acres reached maturity through inability to obtain a strike. Late-planted crops failed under the dry conditions. In several districts the yield per acre was from 800 lb. to 1,200 lb. of good-bodied, full $1\frac{1}{8}$ -in. cotton, and in a few cases as much as 1,500 lb. Returns like these demonstrate the drought-resistant capacity of the Upland type, and indicate that farmers in southern and central areas, where cotton can be grown profitably, should include planting of this crop in their farming plans. Cultural methods had shown a decided improvement. The remarkable results obtained last year by growers who applied methods of sound agricultural practice provided an excellent object-lesson in this connection. Standards generally had been improved, especially in the preparation of the seedbed. Gratifying results were reported from the Callide Cotton Research Station. A crop grown on new land, though planted late, yielded between 1,200 and 1,500 lb. of seed cotton of excellent quality per acre. Pure seed propagation work had continued along approved lines with satisfactory results. Satisfactory progress had been made also in progeny-breeding operations, and one strain has appeared of sufficient uniformity and of desirable characteristics as to warrant its increase. Further tests were in progress.

STOCK FOODS.

By J. C. BRÜNNICH.

The wealth of our State is based to a very large extent on the number of our live stock, and the welfare of the stock again depends entirely on the feeding, therefore the question **how, when, and what to feed** is of greatest importance to farmer and grazier.

All our wool, meat, hides, dairy produce, eggs, and the labour performed by horses and cattle are the result of feeding. All our live stock can be regarded as living factories producing from the feed consumed products useful to man.

As a large portion of our stock in Queensland is pasturing on natural herbage, the feeding, therefore, under normal conditions is more or less outside the province of agricultural science; but in times of scarcity, which periodically occur, hand feeding must be resorted to, and at such times it is of utmost importance to have some knowledge of the composition of various stock foods, which will have to be used in connection with poorer roughage to keep the stock in good condition.

It may be safely stated that at present, in the matter of feeding, local ideas are very elementary, or such mistakes would not be made as feeding starving sheep with chaffed sugar-cane, bought at an exorbitant price, considering that its food value is less than half that of poor bush hay, or a quarter of that of lucerne chaff. Professor Perkins drew attention to similar mistakes made in South Australia in 1914-15, when chaff was the most costly stock food on the market, and still it continued throughout to be most eagerly sought after, to the almost complete neglect of relatively cheaper concentrated food-stuffs.

Objects of Feeding.

The body of the young animal requires a sufficient amount of food to supply the materials necessary for its growth. But even during any part of the growing stage there is a continued breaking down and wearing out of all the tissues of the body, and this loss must be made up by the nutrients contained in the food to keep the animal in a normal healthy condition. Furthermore, food must be supplied to produce the energy for the carrying out of all voluntary and involuntary functions of the body. An animal working hard is using up a large amount of fat and muscle, but even an animal at rest requires food for the production of heat and other involuntary

functions of its body. Summarised the objects of feeding are as follows:—

- (1) To maintain bodily heat;
- (2) To repair waste tissues;
- (3) To reproduce young;
- (4) To form new tissues and organs;
- (5) To perform muscular labour;
- (6) To secrete various products;
- (7) To lay up reserve stores.

Composition of Foods.

In order to get a clear insight in the art of feeding and carrying out of the objects above mentioned, we must understand the composition of the tissues that require building and renewing, and the composition of the foodstuffs available.

The composition of any stock food, analysed according to present conventional methods, is expressed as follows:—

Lucerne hay (in full flower) contains:

Moisture	..	..	..	..	..	10.0 per cent.
Crude protein	..	..	..	..	..	15.0 per cent.
Crude fat	..	..	..	..	..	2.8 per cent.
Carbohydrates or nitrogen free extract, by difference						33.2 per cent.
Crude fibre	..	..	..	..	..	31.0 per cent.
Ash	..	..	..	..	..	8.0 per cent.
						100.0 per cent.

Putting these results in another form, we find—

I. Moisture	..	..	..	..	..	10.0 per cent.
II. Dry matter	..	..	..	..	..	90.0 per cent.
(A.) Ash or mineral matter	..	..	..	..	..	8.0 per cent.
(B.) Organic matter	82.0 per cent.					
				{ Proteins	..	15.0 per cent.
				{ Fats	..	2.8 per cent.
				{ Carbohydrates	..	33.2 per cent.
				{ Fibre	..	31.0 per cent.

I. Moisture.—All foods contain a varying amount of water or moisture, even in apparently dry foods. In the animal body water constitutes about two-thirds of the body weight, and, as a rule, not sufficient water will be supplied by the food, and therefore an additional amount of water must be a separate part of the animal's food, and such water has to be of good quality.

The average amounts of moisture found in stock foods are as follows:—

Oil cakes, meat meals, &c.	..	..	6 to 10 per cent. moisture
Grains, seeds, and meals	..	..	10 to 15 per cent. moisture
Hay	..	..	8 to 12 per cent. moisture
Grasses, ensilage	..	..	65 to 83 per cent. moisture
Roots and tubers	..	..	70 to 90 per cent. moisture

Stock foods, which contain small amounts of moisture, always keep better than moist foods, and foods containing large amounts of water should be cheaper than dry foods.

II. Dry matter of a food is the solid matter left, after all the water has been driven off by artificial drying. The dry matter, on which the actual food value of a stock food depends, can be separated by burning or ashing into—

- (a) Ash or mineral matter; and
- (b) Organic matter.

(A.) **Ash or mineral matters** comprise about 5 per cent. of the bodyweight of an animal, and have most important functions to perform, as they enter into the formation of bones and teeth, of blood, and other fluids of the body, and direct and control various life processes. The importance of ash in stock foods influencing the welfare of stock has already been dealt with in previous papers ("Queensland Agricultural Journal," March and April, 1926). The ash of stock foods should contain sufficient amounts of lime, potash, and phosphoric acid, and smaller amounts of iron, magnesium, soda, sulphuric and hydrochloric acid, silica, and traces of hydrochloric acid and iodine.

As many of our stock foods are deficient in certain mineral matters, they may be supplemented by giving the animals licks.

Excess of mineral matters, as found for instance in immature mangels, and fodders grown on saline country, may cause trouble, just as an excess of salt in the drinking water may cause ill-health and even death of animals.

The amount of mineral in stock food varies with the stage of maturity, as some of the mineral matter is returned to the soil by the plants towards the end of the flowering and seeding stage of growth.

A liberal supply of mineral matter, more particularly lime and phosphoric acid, must be given to young growing animals, and at least double the amount of that actually required for the body should be supplied, as large amounts are wasted in the excreta. Mineral matters are also of the greatest importance to female animals during the periods of reproduction (gestation) and feeding their young (lactation).

A milch cow receiving a liberal ration of food which, however, was lacking in lime, continued during a test, lasting 110 days, to yield about 3 gallons of milk daily. The milk contained about $\frac{3}{4}$ oz. of lime, and a little over 1 oz. of lime was lost daily in the excreta and urine. During this trial the cow must have used up one quarter of the total amount of lime contained in her skeleton to make up for the lime deficiency in the food.

When making up rations the mineral matter of foods must be taken into consideration. All cereals and their by-products are low in lime. Legumes, like clover, lucerne, cowpea, field peas, &c., contain high amounts of lime. The amount of phosphorus or phosphoric acid is low in straw, chaff, potatoes, and other root crops, whereas large amounts are found in cereals, bran, oil cakes, meat, and fish meals.

The amount of mineral matter found in stock foods will vary considerably according to the quality of soil on which they were grown.

During the years 1910 to 1914 a large number of ash analyses were made in connection with an investigation of the food value of various crops, and it is of interest to give a summary of the results of the analyses obtained, showing the variation of lime and phosphoric acid contents and the average amounts.

[illegible]

B. Organic matter is that portion of the food which burns when the material is strongly heated, and consists chiefly of compounds of carbon, hydrogen, and oxygen. These organic compounds were produced in the growing plants with the aid of sunlight from the carbonic acid in our atmosphere and water. The value of any stock food depends practically on the amounts and composition of this organic matter, which may be divided into **nitrogen-free compounds** and **nitrogenous compounds**. The latter in addition to the three elements mentioned contain nitrogen and small amounts of sulphur.

The actual composition of the organic matter is exceedingly complex, being formed of a very large number of organic compounds, but for practical purposes, food analysis divides them into the following classes:—(1) **Proteins**, (2) **Fats**, (3) **Carbohydrates** or as stated sometimes as **nitrogen-free extract**, and (4) **Fibre**.

(1) **Protein**.—The nitrogenous matters of the animal body, the major part being proteins, are found in the muscle, gelatinous parts of bones and tendons, brain, nerves, and other internal organs. Similarly in the stock foods the principal part of the nitrogenous material is protein. Various names have been in use, the compounds also being called proteids, albuminoids; but the name protein first proposed by Chittenden covers the whole class of these compounds. These compounds are some of the most complex organic compounds found in animals and plants, and contain carbon, 50.0-55.2 per cent.; oxygen, 19.0-24.0 per cent.; nitrogen, 15.0-17.6 per cent.; hydrogen, 6.5-7.3 per cent.; sulphur, 0.3-2.4 per cent.

In the conventional food analysis the total amount of nitrogen is determined, and the percentage of total nitrogen found is multiplied by 6.25, under the assumption that the proteins contain on an average 16 per cent. of nitrogen ($\frac{100}{16}=6.25$), and the result recorded as **crude protein**. This amount of crude protein will, naturally, include various other nitrogenous compounds, possessing all different feeding value, and in more complete analyses the **true protein**, the actual **flesh-forming nutrient** of foods is separately determined. Chief among the non-proteins are the **amides**, which are present to a greater or less extent in all foods, particularly in those of vegetable origin. The nutrient value of amides is similar to that of fat and carbohydrates. The value of protein is not restricted to the production of flesh, but in case of any surplus can be utilised for the production of heat and work, or building up of body fat. Fats and carbohydrates on the other hand cannot replace proteins.

In the past century, during the time Liebig did important investigations in agriculture, only one protein was supposed to exist, but subsequent investigation made by a large number of scientists proved the existence of a large number of proteins, which differ from each other with regard to the **amino-acids** they yield when digested. Feeding experiments have also proved that **several of the various amino-acids**, which make up the great number of proteins, **must be supplied** by the food for **complete nutrition**.

Of particular value for the maintenance and formation of growth are **lysine** and **tryptophane**. It was observed by many experimenters that the nitrogen equilibrium was disturbed, when all proteins yielding tryptophane were kept from the ration, which then was rendered incapable of sustaining life, because tryptophane appears necessary

for the normal functioning of the body, while a non-supply of lysine in the protein nutrients temporarily puts a stop to growth, and consequently to the proper utilisation of all the protein products. It was found that foods of animal origin like meat, milk, and eggs contain more of these important constituents than foods of vegetable origin, and for this reason a better rate of growth is obtained when part of the food ration is made up with meat or fish meat, and dairy products for pig feeding. It is of interest to give a short table published by F. E. Corrie, in the "Fertilisers, Feedstuff, and Farm Supplies Journal," October, 1924, showing the various proteins in a number of substances, and the percentage of lysine in each of the proteins present.

Source of Protein.	Name of Protein.	Lysine per cent. in Protein.
Cow's milk	Lactalbumin	9.16
	Casein	7.61 (tryptophane 1.5 per cent.)
Hen's egg	Albumin	3.76
	Vitellin	4.81
Bone, skin, &c.	Gelatin	6.00
Beef	Protein	7.59
Halibut (fish)	Protein	7.45
Earthnut	Conarachin	6.00
Peas	Vicilin	5.40
	Legumin	4.98
	Legumelin	3.03
Kidney bean	Phaseolin	4.58
Soya bean	Glycinin	3.39
	Legumelin	4.91
Maize	Glutelin	2.93
	Zein	Nil (tryptophane nil)
	Leucosin	2.75
Wheat	Glutenin	1.92
	Gliadin	Nil (tryptophane Nil)
	Protein	1.20
Linseed		
Barley	Hordein	Nil

The actual amounts of lysine in some of the grains is very small; working the amount out for wheat, we find—

Proteins in Wheat.

Leucosin	0.4 per cent. with 0.011 percentage Lysine
Protease	0.3 per cent. with ———
Edestin	0.7 per cent. with 0.015 percentage Lysine
Gluten—	
Gliadin	4.35 per cent. with ———
Glutenin	4.5 per cent. with 0.086 percentage Lysine
True proteins	10.2 per cent. with 0.112 percentage Lysine
Crude protein	12.1 per cent.

Maize contains only very small amounts of lysine as it is absent in its principal protein, the zein. Leguminous seeds like peas, beans, and earthnut contain relatively large amounts.

A few of the proteins are extremely poisonous, as for instance **Ricin**, the protein of the castor oil bean. The presence of a few castor oil beans in feed has caused the death of horses.

(2) **Fat**.—The non-nitrogenous part of the animal is chiefly fat, which is used in the production of heat and energy. The amount of fat in the animal varies more than any of the other substances, as it may be as low as 6 per cent., and rise to 30 per cent. and more. The fat is stored up in the animal body and is consumed as required, if an insufficient amount of fat is supplied with the ration.

The term "fat" includes the butter-fat in milk, fat of meat, oil in seeds, wax in plants, &c. In food analysis the amount of fat is determined by extracting it from the dry material with ether or benzine,

and because small amounts of other substances not true fats are also extracted, we call the ether extract **Crude Fat**.

The fats of various foods have not an equal value for the production of animal heat and formation of fatty tissue, the oils from oil seeds and cakes having the highest value, followed by the fat in cereals and leguminous seeds, and the fats in coarse fodders possess the smallest value, being 2.4, 2.1, and 1.9, respectively, as compared with starch, taken as the unit. From these figures it will be seen that fat has practically more than double the value of starch or sugar for the production of heat, and is really the most concentrated of food nutrients.

(3) **Carbohydrates** are a typical vegetable product, found only in small amounts in the animal body. They are composed of the elements carbon, hydrogen, and oxygen, and the two latter always in the same relative proportion as found in water. Usually from 50 to 70 per cent. of the dry matter in stock foods consists of carbohydrates, in soluble and insoluble forms, but all are readily digested by the animals. The carbohydrates can be divided into three classes—

(a) **Sugar**, like cane sugar, fruit sugar, &c.;

(b) **Amyloses**, like starch, dextrin, &c.;

(c) **Mucilaginous substances**, like gum, &c.

The carbohydrates are transformed into other organic compounds, and stored up in the animal body; they also are readily oxidised, and the energy produced by this process of slow combustion is used to perform work and maintain animal heat.

In the practise of conventional food analysis the amount of carbohydrates, also called **nitrogen-free extract**, is generally found by difference.

(4) **Fibre**.—The material forming the cell walls of plants is a carbohydrate **cellulose**, which exists in different forms. For food analysis the **crude fibre** is determined by boiling the fodder with weak acid and with weak alkali solutions, followed by washing, drying, and ashing.

Only portions of this crude fibre can be digested by animals. Towards the ripening period of plants the fibre becomes more woody and less digestible.

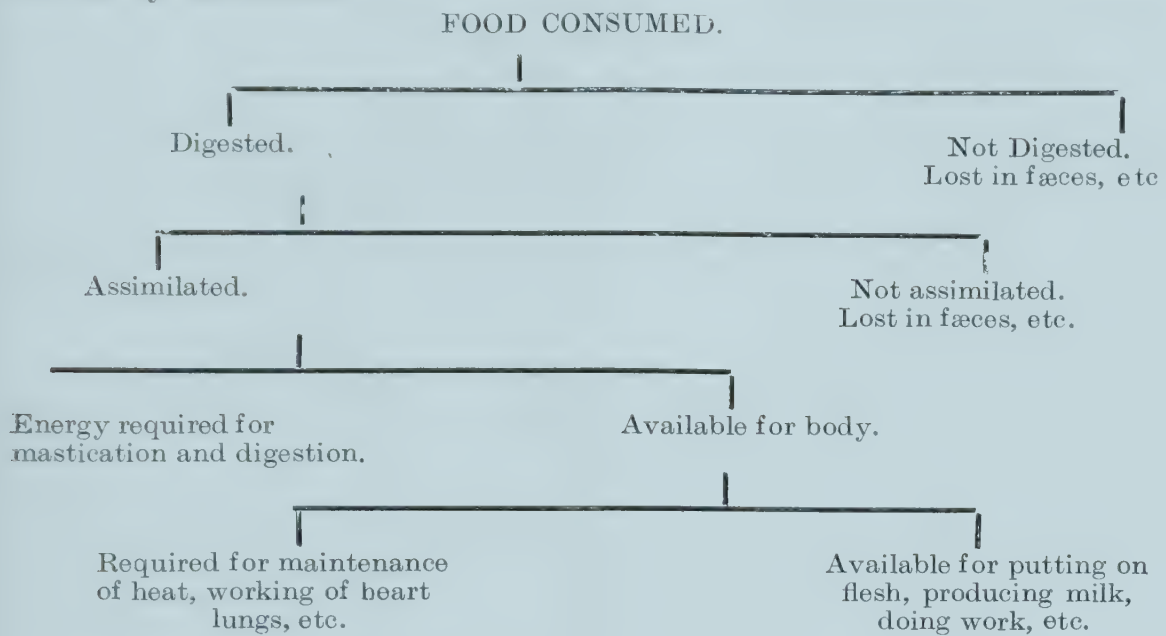
In Table I, the composition of various stock foods stating the percentage of these four principal food constituents, and also the average amounts of moisture and ash they contain, is given in columns 1 to 5. The amount of total dry matter is easily obtained by subtracting the amount of moisture from 100.

In many cases the variation in the percentage amounts of protein, obtained from analyses of stock foods from all parts of Queensland, are shown by giving the minimum and maximum amounts found below the average amount.

Digestibility of Foods.

The chemical composition of the food, as represented by the amounts of crude constituents given in the first five columns of Table I, are not of much value, unless the actual amounts of each of the constituents, which can be made use of by the animal by the process of digestion, are also known.

Let us consider first the actual **fate of the food**, after being consumed by the animal:—



This table shows that only a part of the food nutrients is really available for the main objects of feeding, and that a large portion is lost. The actual determination of the amount of food digested can only be found by a large number of carefully conducted experiments, in which the food material is analysed and weighed before consumption, and the weight and the composition of the animal excrement is determined, at the same time checking by weighing the body weight of the experimental animals. There exist, however, great practical difficulties in the carrying out of these experiments, and only a very small number have been made in Australia, so that we must take for the compilation of a table of **digestibility co-efficients**, in most cases, the results of European and American experiments.

During the year 1920 we carried out some feeding experiments with sheep at the Yeerongpilly Stock Experiment Station, and we found in most cases a good agreement with the usually accepted values; the digestibility of protein and fat was lower in some of our fodders, whereas the digestibility of the crude fibre was in some instances, in lucerne, bush hay, bran, and pollard distinctly higher, and this is probably due to the more quickly growing nature of our plants.

The digestibility of food is influenced by the age of the crop, the conditions of growth, the treatment of the crop at the time of harvesting, and lastly to a very large extent depends on the animal itself consuming the fodder.

From the moment the food is taken into the mouth up to the time it leaves the body continual changes take place. The food is first masticated, ground up into small pieces, and saturated with saliva. Ruminants, like oxen, cows, sheep, and goats, only roughly chew the food during the first mastication, as later on they regurge the food for more thorough mastication and salivation (chewing the cud). For this reason ruminants are able to digest a larger proportion of the nutrients contained in coarser and bulky foods than horses and pigs, which have only a simple stomach. In order to prevent horses eating concentrated foods like grain, oilcakes, &c., too quickly, a certain amount of chaff must be given at the same time to ensure proper

mastication. For pigs, which as a rule chew their food very lightly, any hard or coarse food must be softened by being soaked, steamed, or boiled, as; for instance, in the case of hard grains like maize.

During the process of digestion, which takes place first in the stomach and later in the intestines, the nutrients of the solid food are changed into soluble compounds which can be absorbed. During this process bacteria play an important part, more particularly in the digestion of fibre. The undigested residue of the food is from time to time excreted, and the time during which the food remains in the body depends on the amount of undigested matter and the size of the digestive organs. For ruminants, with an alimentary canal twenty to twenty-seven times the length of the body, it takes from three to four days. Pigs, with an alimentary canal fourteen times as long as the body, from thirty to forty hours, and with horses about twenty-four hours.

In Table II. the digestibility or coefficients of digestibility of the various nutrients of the stock foods, the percentage amounts of each of the crude nutrient digested is given, and the average values were used for the calculation of the percentage amounts of **digestible nutrients** contained in stock foods, given in columns 7 to 11 in Table I.

Nutritive Ratio.—We have already learned that the stock foods vary very much in their composition. All leguminous seeds, oilcakes, and meat meals contain a high percentage of protein and very little non-nitrogenous compounds, whereas grains and rooterops contain large amounts of starchy matter with small amounts of protein. The proportion of these principal nutrients is called nutritive ratio or albuminoid ratio, or the ratio between the digestible pure protein and the sum of all the digestible non-nitrogenous nutrients. In the calculation the high amount of heat produced by fat is taken into consideration, and the formula is as follows:—

$$\text{Nutritive Ratio} = \frac{\text{Digestible pure protein}}{\text{Digest. fat} \times \left\{ \begin{array}{l} 2.4 \text{ for oil seeds and cake} \\ 2.1 \text{ for cereals} \\ 1.9 \text{ for coarse fodder} \end{array} \right\} + \text{digest. carbo-} \\ \text{hydrates} + \text{digest. fibre.}}$$

This nutritive ratio (column 12 in Table I.) must fall between certain limits in order that the food supplied to the animals does not lead to any waste and still keep the animal in good health and condition. The ratio will be different for young growing animals and adult stock, and as a rule for the younger animal a smaller or narrower ratio is required, as in this case the chief function of the food is to build up tissues for which purpose chiefly proteins are necessary.

Milk, which is the natural food of the young animal, has a nutritive ratio of $1 \div 4$. As a rule, it may be stated that the young animals require a ratio of $1 \div 4$ to $1 \div 5$. For adult animals the ratio should be about $1 \div 6$, and for the fattening of adult animals a much wider ratio of about $1 \div 8$ or even more is required. Milking cows need a ratio from $1 \div 5$ to $1 \div 5.4$; a very heavy milker a ratio of $1 \div 4.5$.

In the **chart** given in the appendix the position of all foods in regard to the average nutritive ratio of $1 \div 5$ is clearly shown. All the foods above the line are rich in protein, and the foods below the line contain less protein, and must be mixed with the protein-richer foods to make standard rations.

Starch Equivalent.—In order to compare roughly the total heat-producing and fat-forming powers of stock foods, the value of starch equivalent was introduced, which expresses the amount of pure starch, equivalent to the sum of all the digestible fat-forming nutrients in each food.

The relative fat-forming powers of the various nutrients, is, according to Kellner, as follows:—

1 lb. digestible fat	{	in oily seeds and oil cakes .. ..	.. = 2.4 lb. of starch
		in cereal and leguminous seeds .. ..	.. = 2.1 lb. of starch
		in coarse fodders (grass, hay, and straw) ..	.. = 1.9 lb. of starch
1 lb. of digestible carbohydrates and fibres	.. ..	..	.. = 1.0 lb. of starch
1 lb. of digestible protein	.. ..	..	.. = 0.94 lb. of starch

For exacting work a distinction should be made between maintenance starch equivalent and production starch equivalent, the former expressing the value of the food, equivalent to starch, necessary to maintain the animal at rest, without any gain or loss of weight.

The production starch equivalent, which is given in column 14 of Table I., takes into consideration the **value number** (V.) of foods (column 13 of Table I.), which expresses the percentage availability of the digestible nutrients in the stock food, with 100 being the maximum value.

Experiments have shown that most food stuffs have a food value below the expected value as calculated from the various digestible nutrients, due to the amount of energy wasted in the work of mastication and digestion. Wheat straw, for instance, is from 60 to 70 per cent. below the expected full value of 100, and, therefore, the value number is given as 30. As a rule the low value numbers of all coarse foods are associated with the amount and quality of the fibre present.

The formula for the calculation of the **production starch equivalent** is as follows:—

$$\text{[Digest. protein} \times .94 + \text{digest. fats} \times \left\{ \begin{array}{l} 2.4 \text{ oil seeds} \\ 2.1 \text{ cereals} \\ 1.9 \text{ coarse fodders} \end{array} \right\} + \text{digestible carbohydrates + digestible fibre}] \times V.$$

This calculated value of the production starch equivalent is the best measure for comparing various foods for the production of fat, milk, growth, and work.

Food Units.—The market price of any stock food is by no means a measure of its relative feeding value. In normal seasons the market value of commonly used stock foods finds a level corresponding approximately to their feeding value, but in abnormal seasons many of the stock foods, on account of demand and scarcity, acquire quite exorbitant values. In order to approximately value stock foods and estimate the price of the food units per ton, the food units (column 15, Table I.) are calculated as follows:—

$$\text{Digest. crude protein} \div 2.5 + \text{digest. fat} \times \left\{ \begin{array}{l} 2.4 \text{ for oilcakes} \\ 2.1 \text{ for cereals} \\ 1.9 \text{ for coarse fodder} \end{array} \right\} + \text{digestible carbohydrates + digestible fibre.}$$

By dividing the market value per ton by the number of food units we obtain the cost per unit.

Bran costing £10 per ton is a very expensive food, as with seventy-eight food units would give a cost per unit of $\frac{10}{78} = 2s. 6\frac{3}{4}d.$ The cost per unit was 1s. 11d. in 1919, and only 1s. 2d. in 1914.

The stockowner should therefore carefully compare food units and market price in order to buy stock food economically.

Other important factors influencing the value of stock foods are palatability and succulence.

Palatability is such an illusive subject that it cannot be accurately defined, but is greatly influenced by familiarity and habit or custom. Palatability has an influence on the digestion, but not necessarily all palatable foods are easily digestible, and animals may show likings for food very indigestible and even poisonous. Again, some foods particularly nutritious may be at first refused, but may eventually be readily eaten as soon as the animals get accustomed to it; best results with feeding will only be obtained by using such feeds which are palatable and readily eaten by the animals. Sudden changes of food must be avoided, and any changes by adding new foodstuffs must be very gradual.

Succulence.—The beneficial effects of succulent foods, like green pasture grass, silage, and various roots has been amply demonstrated by scientific feeding trials and by practical common sense experience on farms. Succulent feeds promote digestion and have a highly beneficial slight laxative action. A dairy cow can only give a maximum yield when supplied with a certain amount of succulent food. Succulent food is of particular importance for young animals to promote a rapid sturdy growth, but is just as essential to all stock, horses, pigs, and sheep.

Vitamines.—Besides the nutrients so far mentioned, minute quantities of **accessory foodstuffs**, also called vitamins, are necessary for the maintenance of health and normal development of all animals. At least three classes of such foodstuffs are known to exist—

Fat soluble A, found in butterfat, yolk of eggs, milk, liver, &c., and in green leaves of plants;

Water soluble B, found in whole seeds and products made therefrom, in tubers and fleshy roots, leaves of plants, milk, and eggs; and

Water soluble C, found in abundance in fresh vegetables, fruits, and fresh milk from cows fed on pasture.

All cereal grains, seeds of legumes, tubers, and edible roots are deficient in fat soluble A, lime, and salt, and their proteins are frequently of poor quality.

The palatable green leaves, although low in total amount of nutrients, are complete foods for all animals which are able to consume large quantities.

Comments on Various Stock Foods.

Grass.—Natural grasses are without doubt the cheapest of stock foods, but as we can see from the analyses, ordinary pasture is of very varying composition, and therefore stock which depends on natural pasture alone are only for short periods of the year “on clover.”

I cannot refrain from quoting here an extract from a lecture on stock foods, delivered at the Beenleigh and Rockhampton agricultural conferences by Professor E. M. Shelton. The remarks made over thirty years ago by this keen observer of wide practical experience apply

equally to the present day, and put the position of dairying and grazing on natural pasture in a nutshell:—

“ Our Great Reliance on Grass.

“The natural grass in Queensland is so abundant and unfailing, and, as compared with artificial forage, so easily got that stockowners outside of towns complacently regard it as a sufficient food for all classes of stock at all times and seasons. It is only when protracted drought becomes calamitous that stockowners begin to realise the dangers of complete reliance upon natural supplies of stock food. Even during favourable seasons the annual loss, from the poverty of wild grasses during the winter months, must in the aggregate be enormous. During much of every winter our herds are losing the flesh accumulated during favourable summer months, thus literally converting flesh into nearly worthless manure, a process that can hardly prove profitable to the stockraiser. Let this be understood: good grass is the cheapest and best single stock food. No form of artificial food, whether grain, roots, or residual products, can compete in cheapness with natural herbage as a source of beef, mutton, and the other products of feeding; but to rely wholly and entirely upon the spontaneous herbage is to fail in obtaining the principal advantages derivable from such natural pastures. By piecing out the failing grass with hay, silage, or green fodders, we keep our animals in the highest working condition with that **small amount** of feed that every stockman knows is required to maintain vigorous, thick-fleshed animals up to their greatest efficiency. After the animal once becomes reduced in flesh, let the owner attempt to bring it up again to its condition of greatest usefulness as a milker or meat-making machine, and he will have it brought home to him, in a thoroughly practical way, how great his loss has been through sparing the feed. **Other things being equal, the animal that consumes the most feed gives the largest profitable return for feeding.** A hint of why the full-fed animal returns the largest available profit is furnished by our knowledge of the ultimate use to which food is put. It is plain that food is applied to two purposes: it goes to make up the loss of the animal machine itself through constant wear; and it is applied towards the production of the object of feeding—milk, beef, wool, &c. It is clear also that if the animal gets of food only sufficient to supply the constant wear and tear incident to existence, the feeder gets nothing in return for his feeding. But if he gives in quantity beyond the vital demands of the animal, that surplus will, more or less, go to the production of the valuable article which is the principal object of his feeding. Profit always comes out of the excess feed, and not from the small amount that is really required to maintain existence.”

Quite excellent hay can be made from our natural pasture grasses, and an analysis of “bush hay” over fifteen years old showed it to possess a fairly high feeding value.

Unfortunately in good seasons enormous amounts of grass go to waste, as all the grasses, after being dried up, exposed to dews and scorching sun, rapidly deteriorate, losing colour, flavour, and quality, and have but little feeding value, so that they are only fit to be burnt off.

There is but little difference between the food values of the various most popular cultivated grasses—Paspalum, Canary grass, Rhodes grass, Sudan grass, and others—yet the variation in the composition

of the sample, according to season, locality, and age of crop in each species, is very much greater than the variation in composition from one species to another. It is quite obvious that it is impossible to judge the value of any grass by a few isolated analyses.

There are a few grasses like Couch grass (*Cynodon dactylon*) and Prairie grass (*Bromus unioloides*) which stand out on their own on account of high food value.

Roots and Other Succulent Stock Foods.

In Europe, Canada, and also in New Zealand, for the feeding of dairy stock, in addition to a rich pasture containing clovers, root crops play an important part. In our State we can supplement our natural pasture with the more valuable crops of lucerne and maize, and to some extent with pumpkins.

Mangels are the most watery of stock foods. Many of the Queensland-grown samples have a very low feeding value, much lower than the value obtained in root-crop-growing countries where the quality with regard to protein contents has been steadily improved by careful selection of seed. However, a special variety or cross of mangels, the "sugar mangel," several samples of which were analysed from the crop grown on our State farms, from seeds imported by Sir Matthew Nathan from the Cambridge School of Agriculture, gave as much as 1.7 per cent. of crude protein, making them a valuable food, as compared with our ordinary mangels containing only 0.6 per cent. of protein. Mangels and beets should not be fed to male sheep for long periods, as they are likely to cause urinary troubles.

Pumpkins are greatly relished by cattle, horses, and pigs, and are rather more nutritious than mangels. The seeds contain much protein and oil and should therefore not be wasted. Pumpkins are preferably fed raw to pigs. The seed act as a slight vermifuge; fed in excess, however, the seeds may cause digestive troubles. Cases have been reported that pumpkin seeds caused trouble when fed to poultry.

Potatoes and sweet potatoes contain about twice as much dry matter as mangels. They have a good food value, but as a rule have too high a commercial value as human food to make them profitable for feeding of stock.

Sweet potato vines are a very nutritious succulent food. They must be fed with caution to pigs, as in a few instances we found a hydrocyanic acid yielding glucoside in these vines. Any danger, however, is minimised by sprinkling a little molasses over the vines before being fed.

Silage.—One of the most economical means of preparing succulent foods for dry seasons and general use is by means of a silo. The most suitable crop for this purpose is maize. Crops of saccharine and non-saccharine sorghums may also be used; in fact, any succulent green crop may be utilised for the making of silage. Sunflowers, according to American and Japanese reports, make an excellent ensilage. A very fine sample of silage once submitted for analysis was made from wheat, thistles, and mustard. Another good sample was made with alternate layers of maize and prickly-pear. Leguminous crops, like lucerne, make a poor foul-smelling ensilage. The process of fermentation taking place in the silo has an influence on the nutrients in the food, some of the carbohydrates are lost, as well as small amounts

of proteins are decomposed; again the digestibility of the remaining protein is somewhat lowered. These losses, however, are fully compensated by the succulence and palatability of the ensilage. No better ration for milking cows could be found than a mixture of lucerne hay and maize ensilage, with small amounts of bran and pollard or oil cakes.

Hay.—The simplest and best way to preserve green fodders, which has been practised from time immemorial, is to make them into hay by drying in the air in the sun. The moisture can be reduced to 8 per cent., and all further fermentation is arrested. If the hay is not properly dried, detrimental changes can take place during storage. The quality of the hay depends: (1) on the quality of the raw material, (2) on losses and changes during the drying, and (3) on changes which may take place during storage.

Lucerne hay is an almost ideal food for dairy stock. When cut very young, before flowering, the nitrogen ratio is a little too high, but the ratio is lowered when cut in full flower.

Straw.—When plants mature a large proportion of the organic compounds, both nitrogenous and non-nitrogenous nutrients, are transferred from the green portion of the plants to the seeds. At the same time all stems and stalks become harder as the cellulose of the fibre becomes more and more lignified, and but small amounts of proteins, fat, and nitrogen-free extracts remain in the straw or chaff when the ripening of the seeds is completed. In samples of oat straw, cut at various periods of maturity, the amount of crude protein fell steadily from 10.1 per cent. to 4.3 per cent., and at the same time the crude fibre was increased from 29 per cent. to 50 per cent. The lignification of the cellulose or fibre in straw causes, when used as a feed, a great loss of energy for mastication, and consequently from 70 to 80 per cent. of the available digestible nutrients are used up to supply the energy required for mastication and digestion, and only from 20 to 30 per cent. of the nutrients are available for maintenance and production.

Cereal straws are very poor stock foods, and should only form a small portion of the ration. Ruminants can be given larger quantities than horses.

Leguminous straws are of considerably better food value, but not very palatable to stock—especially to horses.

Chaff.—Although the term chaff is elsewhere accepted as meaning the husks, or outer envelopes of cereal grain, with any light debris that may arise in threshing, in Queensland the term indicates hay or straw cut up into short lengths.

Unfortunately the chaffing of hay and straw tends to hide any foreign matter that such material may contain; further, the term **hay** should only be applied to any dried or cured cereal, grass or legume cut **before complete ripeness**, and in which the grain or seed has not been fully developed or removed. **Straw** implies any dried **ripe or mature** material from which the seed or grain has been removed by any process.

Chaff is liable to contain a good deal of rubbish like sand, earth, dust, weed seeds, moulds, and spores of fungi, &c., which can cause serious troubles, and therefore if poor qualities of chaff have to be used, in case of necessity, such chaff should be scalded or steamed before being fed. A good many samples of chaff have come on the market lately, which contained a large amount of stalks, leaves, and

seeds of the thorn apple (*datura stramonium*), a highly poisonous weed. Such chaff is very dangerous to stock, and cannot be used as a feed, and the sale of any chaff or hay containing this weed is an offence under the Stock Food Act. Farmers should take particular care to prevent the spreading of this noxious weed.

Grains and Seeds.—The composition of the grains and seeds depends largely on the state of ripeness when harvested. Immature seeds contain more protein and mineral matter, and less nitrogen free extract than ripe ones. The quality of all grains is also influenced by soil conditions, manuring, and season.

Oats may be considered the most valuable of cereal grains, and has no equal for the feeding of horses. They are a very good milk-producing food, if they can be obtained cheaply enough. Ground or crushed oats are excellent for calf rearing, as a supplement to skim milk.

Barley is particularly useful for fattening all stock, and a standard food for pigs. An excellent ration for breeding pigs is made up from 30 per cent. barley meal, 30 per cent. maize meal, 35 per cent. pollard, and 5 per cent. meat meal or blood meal. The latter promotes growth and can be left out during fattening period, and increasing at the same time the amount of barley and maize meal.

Wheat.—On account of its price wheat is only rarely used for feeding of stock; low grade and damaged wheat is a valuable food for poultry, and the shrivelled wheat generally contains more protein than first-grade plump wheat. Fresh wheat, whole grains, are dangerous to stock, and if used for fattening of cattle and pigs should be crushed or ground. The by-products of milling wheat, **bran** and **pollard**, are of particular value. Bran, the outer coating of the wheat kernel, is rich in digestible protein, digestible carbohydrates, and fat, and contains comparatively high amounts of mineral matters, phosphoric acid, magnesia, and potash, but is poor in lime. Bran has a beneficial laxative effect, which is increased by giving it in form of a bran mash.

Maize is suitable for all stock, but on account of its hardness not so easily digested as other grain, and therefore preferably fed in ground form as **maize meal**. Maize of all the cereal seeds contains the least amount of lime, and its proteins are very deficient in lysine. Maize is chiefly a heat and fat producing food.

It is of interest to note that the protein content of maize has been gradually decreasing year by year in Queensland. Twenty-three years ago a large number of different varieties of maize were analysed and found to contain high amounts of crude protein, averaging 13.5 per cent., and ranging from 12.1 to 13.8 per cent. An imported maize from the Argentine, containing 10.7 per cent. of crude protein, gave after being grown on our State farms 12.9 per cent. At that time I claimed our Queensland grown maizes to practically equal wheat as a food for poultry, &c. Since that time, however, a change has taken place, and the average of many samples analysed during the last three years was only 9.5 per cent. of crude protein, varying between 8 and 13 per cent. It is quite evident that our present maize is more valuable as a material for the production of cornflour and glucose, or production of power alcohol, than as a stock food. Maize grown for stock food purposes should be from specially selected seeds rich in protein. Of a very high food value are the by-products from maize, viz., maize

germ meal, polly meal, maize gluten meal, &c., which were on the market some years ago, but are at present not procurable, as they are eagerly bought up in the States where the factories utilising maize exist.

Leguminous Seeds.

Beans, peas, cowpeas, &c., are very nutritious food, containing large amounts of protein, and can be used for all stock. If fed in large amounts they may cause constipation and also thickening of the blood, and therefore should not form more than one-fifth to one-quarter of the grain ration. Leguminous seeds should be given either ground, crushed, or soaked. A few species of leguminous seeds, like Java bean are poisonous, containing a hydrocyanic yielding glucoside.

Oily Seeds.

Linseed, slightly crushed, is an excellent calf food, as it contains a large amount of fat. The by-product from the manufacture of linseed oil—the linseed cake—is one of our most soluble concentrated stock foods, but unfortunately the quality of linseed imported for the manufacture of oil is very much lower in its protein content than the linseed used in Europe, our linseed containing only 18 per cent. of crude protein, as compared with 24.2 per cent., the average in England. Again our cake contains only 25.5 per cent. of protein, as compared with European cake containing from 29.5 to 35 per cent.

Linseed cake used to contain from 9 to 10 per cent. of fat, and this made it valuable as a calf food to replace the fat lost in the milk on separating, but a new process of manufacture brings the oil contents down to 2 per cent. and less, and make the cake of much less value for calf feeding. All linseed contains more or less of a hydrocyanic acid yielding glucoside, and must be therefore used with caution, and never fed in excess. Several cases of death among calves have been reported, due to giving excessive amounts of linseed meal.

Sunflower Seeds and sunflower oil cake, if procurable, are excellent foods, suitable for all kinds of stock.

Peanuts or Earthnuts are a suitable feed for cattle, sheep, and pigs. If given in excess to pigs produces soft fat and inferior pork.

Peanut Cake is the richest of all our oil cakes. The vines of the peanuts may be collected and cured into a nutritious palatable hay. Peanut hulls ground are frequently used for the adulteration of stock foods; they have very little food value, on account of the high amount of fibre.

Cotton Seed is always used in Queensland in form of cotton seed meal, after extraction of the cotton seed oil, and up to the present cotton seed cake of local manufacture has not been put on the market. If the hulls are not removed before crushing **undecorticated meal** is obtained, which is of much less value than the **decorticated meal**, which contains no hulls. Undecorticated meal, on account of the indigestibility of the hulls, is a most constipating food, whereas decorticated meal is a valuable concentrate, suitable for cattle and sheep, but **not for pigs**. It is a good milk-producing food, and also good for fattening cattle and sheep.

Coconut Cake or Copra Cake.—The by-product of the manufacture of coconut oil is a very palatable and pleasant smelling concentrated food, suitable chiefly for dairy cows, but also for general use for cattle,

sheep, and pigs. The coconut cake should be soaked before being used, as it swells very considerably on absorption of water. When fed to dairy cows it helps to produce a good firm butter, whereas linseed meal tends to soften the butter, and cotton seed meal again produces a hard sallowy butter, of light colour and poor flavour.

Other By-products and Various Foods.

Meat Meal.—The by-products of meatworks sold under various trade names, as meat meal, dried liver, and lights, bovvaline, mutton protein, protein meal, ox-a-vita, &c., are valuable concentrated stock foods, and small amounts can form part of the rations for dairy cows, pigs, and poultry. Meat meal particularly promotes growth, as already explained before.

Blood Meal made from dried blood is another highly concentrated food, of similar use as meat meal. Ordinary dried blood, in coarse granular form, should never be used as stock food, as on account of the high nutritious qualities, inflammation of the stomach lining sets in where the hard grains come in contact. Serious injuries to pigs and poultry have been caused when feeding such coarse dried blood. Proper blood meal for stock food should be as fine as flour, and is highly digestible, and therefore used in small quantities only.

At the Yeerongpilly Stock Experiment Station, when carrying out feeding experiments with sheep, we found that of the crude protein in somewhat coarse blood only 61 per cent. was digested, whereas in the fine blood meal 89 per cent. was digested.

Molasses, the by-product of the manufacture of cane sugar, is palatable and much relished by stock. The feeding value consists entirely of soluble readily digested sugars, and molasses is therefore a heating and fat-producing food and supply no protein whatever. Amounts from 2 to 3 lb. daily can be given to horses and cows, sprinkled on roughage, which is made more palatable. Molasses act as an antidote against hydrocyanic acid poisoning, and therefore foods like young sorghum, Sudan grass, and cowpea vines, which may contain a hydrocyanic acid yielding glucoside in dangerous amounts, should be sprinkled with molasses before being fed to stock.

Compressed Concentrated Foods.—Hand feeding of sheep, more especially of large mobs of starved animals, has always been a big problem, as it is almost impossible to provide sufficient troughing to give all animals an equal chance, and the weak ones have generally to go without food. The use of troughs also leads to bolting of food and general waste. As sheep can pick up grain from the ground, as well as poultry, our sheep expert, Mr. W. Brown, recommends to dribble grain like maize and barley in a thin line on the circumference of large circles, which gives every sheep a chance to pick up a few grains. At present compressed concentrates are on the market which are particularly suited for hand feeding of sheep. Amongst the available foods we find linseed nuts, cotton seed, treacle cubes, and kubettes for sheep. These nuts should not be too large (cubes from $\frac{1}{2}$ to $\frac{3}{4}$ inch) and should if possible be made from a mixture of various grains, meals, and by-products in order to give the animals a variety of proteins, so beneficial to the general health. Amongst the available foods are linseed nuts (a form of linseed cake broken up into small pieces of suitable size for feeding of sheep), cotton seed, and treacle cubes. Each

of these products is made from a single by-product, and contains rather too high an amount of protein, whereas kubettes are made from a very large number of products containing an amount of protein equal to ordinary cereal grain, and are undoubtedly the most suitable food for hand feeding of sheep at present on the market. The manufacture of such compressed concentrates should be very much extended, and if offered at reasonable cost will lead to large consumption throughout the year because there are many localities where the addition of a little concentrate would be highly beneficial to grazing sheep.

Licks.—In many districts the supplying of licks containing **salt**, **lime**, and **phosphates** to stock is an absolute necessity, and nearly everywhere such licks can be given to benefit the health of the animals.

Fine Bone Meal can be mixed with coarse salt and forms a good lick, as long as care is taken that the bone meal is of good quality and specially sterilised by heating with super-heated steam. Ordinary bone meal as used as fertiliser should on no account be used. A good substitute for bone meal, supplying large amounts of lime and phosphoric acid, is **finely-crushed Nauru** or **Ocean Island phosphate**.

The licks should always be placed in sheltered troughs, preferably of the continuous supplying type recommended by our Department. A mixture of equal parts of coarse salt and phosphate makes a cheap effective lick. Small amounts of sulphur, adding, say, 2 lb. of flour of sulphur to every 100 lb. of salt and phosphate mixture, will be found beneficial. An addition of the same amount of carbonate of iron, or of sulphate of iron, will improve the health of stock in many districts.

“The Stock Foods Act of 1919.”

Queensland possesses in the Stock Foods Act a piece of advanced legislation for the protection of all buyers of stock foods, which is far ahead of any similar Act in other Australian States, and quite up to the standard of such Acts existing abroad. This legislation, which at first met with some opposition on the part of the sellers, as it was considered to harass trade unnecessarily, is now welcomed by genuine manufacturers and dealers as a protection against unfair competition by unscrupulous traders, and puts the manufacture and sale of all stock foods on a sound basis.

Under the Act all wholesale sellers of any mixed concentrated or prepared stock food, which includes all kinds of meals and foods for stock, prepared in whole or in part, from one or more than one kind of grain or oils or juices of meats or other source, and any condimental patented or proprietary stock food claimed to possess nutritive as well as medicinal properties, must every year submit samples of such foods to the Under Secretary, and at the same time state the composition and food value of such samples. Certain stock foods must be labelled, stating on the labels the number of net pounds in the package, the distinguishing name or trade mark of the food, name and address of seller, and chemical analysis of the food, giving minimum amounts of crude protein and crude fat, and maximum amount of crude fibre. The seller must give at the time of sale an invoice certificate, giving among other things the gross weight, warranty about composition and amounts of foreign ingredients, &c. Upon the sale of hay, straw, and chaffs made therefrom, and mixed chaff, the invoice must specify each component, and in case of mixed chaff and straw chaff the package must be labelled M.C. and S.C.

respectively. Unfortunately the great majority of our stock food buyers pay but little attention to labels and invoice certificates, which are frequently torn up and thrown away, and therefore do not derive the full benefit of the Stock Food Act. The monetary value of any stock food can be enormously influenced by variation in the amount of protein and fat contained in the food, and therefore the stockowner, poultry farmer, &c., should carefully study the labels of various samples and compare them with the prices, in order to buy most economically.

Feeding Standards.

For the guidance of the stockowner in choosing and making up suitable rations, based on the composition of the various stock foods, it is necessary to draw up feeding standards, stating the amounts of each class of nutrient necessary to be provided in the rations for farm animals of all classes and ages, to keep them in best condition and obtain a maximum of production. During the last century many of such standards were drawn up by eminent men like Welff, Atwater, Armsby, and Lehmann. Table III. gives the latest **standard rations** according to Dr. O. Kellner, the director of the Möckern Experiment Station (Germany), based on the amounts of dry matter, digestible protein, and starch values required for the rations.

How to Make up Rations.

As a basis for the making up of rations we must take into consideration the fact that a ruminant can eat daily an amount of fodder which contains dry matter equal to $2\frac{1}{2}$ to 3 per cent. of the body weight of the animal. This amount is for full-grown animals, for maintenance and at rest, only from $1\frac{1}{2}$ to 2 per cent., and for heavy milkers up to $3\frac{1}{2}$ per cent. of the live weight.

A cow from 750 to 800 lb. live weight, yielding daily $2\frac{1}{2}$ gallons of milk, would require, as calculated from Table III., per day a ration containing—

Dry Matter.	Digest. Protein.	Starch Equivalent.
23 lb.	1.65 lb.	9 lb.

For convenience and rapid comparison of all stock foods, the last two columns (16 and 17) of Table I. show the amounts of stock foods in pounds required to supply 1.65 lb. of digestible pure protein and 9 lb. starch equivalent.

We will start a ration with **good lucerne chaff**—

	Dry Matter.	Digest. Protein.	Starch Equivalent.
25 lb. of lucerne chaff contains	22.6	2.58	7.45

which would supply an excess of nitrogen and not sufficient starch equivalent, which is quite apparent from columns 16 and 17, which show that only 16 lb. would be required to supply the necessary nitrogen and 30 lb. to supply the starch equivalent on account of the narrow nutritive ratio (column 12) of $1 \div 3.6$, whereas we want a ratio of about $1 \div 5$.

By reducing the amount of lucerne chaff and substituting the same amount of **wheat hay chaff** we get:

—					Dry Matter.	Digest. Protein.	Starch Equivalent.
13 lb. of lucerne chaff	..	..	..	..	11.7	1.34	3.9
13 lb. of wheat chaff	..	..	..	..	11.4	0.19	3.8
					23.1	1.53	7.7

The amount of protein is lowered a little too much and we have not sufficient starch equivalent. We must reduce the amount of chaff and add a more starchy food like **maize meal**, and make up the following ration, which brings the ration up to standard.

—					Dry Matter.	Digest. Protein.	Starch Equivalent.
13 lb. of lucerne chaff	..	..	..	..	11.7	1.34	3.9
10 lb. of wheat chaff	..	..	..	..	8.8	.15	2.9
3 lb. maize meal	..	..	..	..	2.6	.14	2.1
					23.1	1.63	8.9

If we start as basis of a ration with a **good bush hay** we find in:

—					Dry Matter.	Digest. Protein.	Starch Equivalent.
25 lb. good bush hay	..	..	..	..	23.0	.48	8.2

This ration is very deficient in digestible protein, and slightly deficient in starch equivalent.

If we replace 8 lb. of hay by 8 lb. of **maize meal** we obtain—

—					Dry Matter.	Digest. Protein.	Starch Equivalent.
17 lb. bush hay	..	..	..	..	15.6	.32	5.6
8 lb. maize meal	..	..	..	..	6.9	.37	5.6
					22.5	.69	11.2

The ration is still very deficient in protein, and too high in starch equivalent, maize being a one-sided starchy feed and we must therefore substitute much more nitrogenous concentrates like cotton-seed meal or linseed meal.

—					Dry Matter.	Digest. Protein.	Starch Equivalent.
17 lb. bush hay	..	..	..	..	15.6	.32	5.6
4 lb. maize meal	..	..	..	..	3.5	.19	2.8
2 lb. bran	..	..	..	..	1.8	.23	.9
2 lb. cotton-seed meal	..	..	..	..	1.8	.67	1.3
					22.9	1.41	10.6

The ration is still rather low in digestible protein for a milking cow and a little high in starch equivalent. The bush hay is evidently too poor to form a suitable basis for the ration, and the amount of concentrated food should not be raised over one-third of the total ration. The ration would have been still very much poorer if a poor quality bush hay had been used. The ration could be brought up to standard by increasing the cotton-seed meal to the maximum amount which can be safely given to a cow, making the ration as follows:—

—					Dry Matter.	Digest. Protein.	Starch Equivalent
17 lb. bush hay	..	..	..	..	15·6	·32	5·6
3 lb. maize meal	..	..	..	..	2·6	·14	2·1
2 lb. bran	..	..	..	..	1·8	·23	·9
3 lb. cotton-seed meal	..	..	..	..	2·7	1·01	2·1
					22·7	1·70	10·7

All the rations so far mentioned are deficient in not containing any succulent food, which is so essential to milking cows.

An excellent ration could be made up with **maize silage** as a basis, and using such concentrates in addition which are at present the cheapest foods on the market:

—					Dry Matter.	Digest. Protein.	Starch Equivalent.
40 lb. maize silage	..	..	..	..	12·0	·24	5·6
8 lb. lucerne chaff	..	..	..	..	7·3	·82	2·4
3 lb. barley meal	..	..	..	..	2·6	·25	2·2
1 lb. cotton-seed meal	..	..	..	..	0·9	·34	0·7
					22·8	1·65	10·9

This ration is just a little high in starch equivalent, but otherwise correct.

Similar rations can be made up from any material on the farm, by using the table of analysis of foods.

Feeding of Horses.

When making up food rations for horses we must remember that the digestive organs of a horse differs from those of ruminants. A horse cannot digest such large amounts of coarse bulky food rations as given to cows, and as a rule only one-third of the amount of roughage given to a cow should be supplied to a horse. Hand-fed milking cows should receive approximately one-third of the total dry of the ration in form of grain or concentrated foodstuffs, whereas to working horses one-half of the dry matter of the ration can be profitably given in form of grain or concentrates.

Valuable work with regard to horse feeding was done some years back by Professor A. J. Perkins in South Australia, paying particular attention to the “feeding value” prices of various foodstuffs in normal and abnormal seasons. Professor Perkins also collected data about the rations fed in old established livery stables and city carriers, and

it was interesting to note how closely the rations, found to be most suitable by long continued practical experiences of these firms, agree with Kellner's standards.

Light horses (averaging 1,000 lb. live weight) doing mail and other fast road work received a daily ration of 24 lb. wheat hay chaff, 2 lb. bran, and 2 lb. pollard, and twice weekly from 6 to 8 lb. of green lucerne.

Draught horses (1,400 lb. live weight) doing road and slow delivery work received 32 lb. wheat hay chaff, 8 lb. bran, and twice weekly 8 to 10 lb. of lucerne; an additional allowance of 4 to 6 lb. of crushed oats was given when doing long and heavy trips.

Another firm of carriers fed to medium draught horses (1,200 lb. live weight) a ration of 32 lb. wheat hay chaff and 5 lb. of bran, with an additional 5 lb. of oats in the winter months. When chaff became too expensive, they used with good results a ration consisting of 25 lb. of wheat hay chaff and 10 lb. crushed maize.

Feeding of Pigs.

The general rules laid down for feeding of stock apply to pigs, and there are no farm animals (the milking cow excepted), which put their food to better use than pigs. The aim of the pig farmer should be to produce as much growth as possible in the shortest time, and for this reason the ration for the young growing pig should be more nitrogenous, with a narrow nutritive ratio of about $1 \div 4$. The amount of carbohydrates may be increased as the pigs grow older, and more so in the fattening period.

Lucerne is one of the best foods for pigs, and a field of lucerne is the only pasturage where pigs can be raised without any other food. As already pointed out, young growing pigs should, if possible, obtain some of the protein from an animal source, and for this reason skim milk is of particular value as part of a ration for pigs. Ground barley, where obtainable at reasonable cost, is another staple food for pigs.

A standard ration for ten young pigs of about 50 lb. average live weight would consist of 6 lb. pollard, 10 lb. ground barley, 4 lb. lucerne hay (chaffed) soaked in 4 gallons of skim milk. The 4 lb. of lucerne hay could be replaced by about 18 lb. of fresh cut green lucerne.

In cases where no lucerne is available more grain may be used, giving a ration consisting of 11 lb. pollard, 7 lb. crushed maize, 2 lb. linseed meal, with 4 gallons of skim milk.

As succulent foods sweet potatoes, swede, sugar mangels, pumpkins may be used. Separated or skim milk can be replaced by buttermilk.

With the ruling high prices which have to be paid for pollard and all concentrates, the standard rations above mentioned could not possibly be profitable and would have to be modified by utilising to a large extent succulent crops grown on the farm. From one-third to one-half of the ration must be made up from root crops, green crops like sorghums, rape, &c.

The importance of growing only such varieties of root crops which are particularly rich in nitrogenous matter is quite apparent, and the cultivation of sugar mangels already alluded to, containing three times the amount of nitrogen than the ordinary mangel, should be encouraged in all localities where it can be successfully grown.

The success of any pig farm will depend entirely on the quality and quantity of the food grown on the farm.

Feeding of Poultry.

Practical experience has taught the poultry farmer that laying hens require a ration fairly rich in nitrogenous nutrients, part of which should be of animal origin. A nutritive ratio from $1 \div 4\frac{1}{2}$ to $1 \div 5$ has proved successful.

Hens of a heavy type require comparatively less food than the more energetic lighter types.

According to Professor Wheeler, of the New York State Station, hens in full laying require:

DIGESTIBLE NUTRIENTS PER DAY PER 100 LB. LIVE WEIGHT—					
				Total Dry Matter.	Protein.
				Fat.	Carbo-hydrate.
				Lb.	Lb.
Hens from 5 to 8 lb. weight	..	..	..	3.30	0.65
Hens from 3 to 5 lb. weight	..	..	..	5.50	1.00
				0.20	2.25
				0.35	3.75

In accordance with these amounts the daily ration for 100 laying hens, of light weight, should consist of 16 to 18 lb. dry matter, 2.50 to 3.0 lb. protein, 0.5 to 1.0 lb. of fat, and 10.0 to 11.5 lb. of carbohydrates.

Hens can only digest a very small amount of crude fibre, and this fact must not be lost sight of when choosing the most suitable grain for feeding, and for this reason oats are not so suitable as wheat or barley.

Of importance is a plentiful supply of mineral matters, containing lime and phosphoric acid, and grit and charcoal to aid in digestion.

A few standard rations to supply a liberal amount of food required by 100 hens of an average weight of 4 to 5 lb. per day can be made up as follows:—

I.	II.	III.
19 lb. wheat	11 lb. wheat	1 lb. wheat
5 lb. pollard	3 lb. bran	3 lb. bran
5 lb. bran	4 lb. pollard	5 lb. crushed barley
5 lb. (1½ gall.) skim milk	2 lb. lucerne meal	5½ lb. copra cake
	1 lb. meat meal	5½ lb. lucerne meal

An occasional change of the constituents of any ration is generally beneficial, but any change must be made very gradual, as with a sudden change of food fowls may refuse to eat it.

The amount of food required by growing chicks, per 100 lb. live weight, is much greater than the amount for fowls above mentioned. Pullets weighing about 1 lb. require just double the amount of food than given to hens of light weight.

At the present time dry mash feeding from suitable hoppers has become popular and is very successful, where a large number of fowls are kept. A good dry mash is made up as follows:—Four parts (by measure) of bran, one part each of pollard, ground oats, ground barley, corn meal, beef scraps, with ½ lb. of salt for one bag of the mixture.

Any other grain or seed, like Kaffir corn, sorghum seed, sunflower seed, panicum, canary seed, peas, beans, &c., may be substituted for other seeds, if obtainable at reasonable cost, always bearing in mind that the seeds, as feed for fowls, must be chiefly judged by their protein content, and not so much by number of food value.

In conclusion, I must point out that the figures given for the compounding of rations cannot be followed implicitly in all cases, but a certain latitude must frequently be allowed.

The objects of the pamphlet are chiefly the spreading of knowledge with regard to stock food in general, to eliminate errors in feeding, and more particularly to draw attention to some of the foods hitherto neglected, which can take the place of other more expensive foods. In nearly all cases practical experience is a valuable guide, but whenever possible combine "Practice with Science."

TABLE I
Composition of Stock Foods.

	CRUDE NUTRIENTS PER CENT.						DIGESTIBLE NUTRIENTS PER CENT.						PER 100 LB.			LB. OF FODDER TO SUPPLY.	
	Moisture.	Protein.	Fat.	Carbohydrates.	Fibre.	Ash.	Crude Protein.	True Protein.	Fat.	Carbohydrates.	Fibre.	Nutritive Ratio 1 :	Value.	Starch Equivalent.	Food Units.		
Green Fodders.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. GRASSES AND CEREALS																	
Barley, in flower ..	79.0	2.7	0.6	8.0	7.9	1.8	1.8	1.5	0.4	6.0	4.3	7.3	80	9.9	15.5	110	91
Buffalo grass ..	78.0	2.1	0.5	12.3	4.6	2.5	1.4	1.2	0.3	8.8	2.9	10.3	80	10.7	15.8	138	84
Canary grass ..	76.5	2.8	0.6	12.1	5.8	2.2	1.8	1.5	0.4	8.6	3.2	10.9	80	14.2	20.8	110	64
		(2.3)															
Couch grass ..	74.1	4.1	0.4	10.0	8.4	3.0	3.0	2.0	0.2	7.0	4.9	6.2	85	12.1	19.8	83	74
Flinders grass ..	68.0	1.8	0.4	11.3	14.0	4.5	1.2	1.0	0.2	7.8	8.0	16.2	76	13.0	19.2	165	69
		(1.2.2.5)															
Foxtail millet (<i>Setaria italica</i>)	87.0	1.3	0.2	6.2	4.1	1.2	0.7	0.4	0.1	3.8	2.2	15.5	82	5.4	8.0	412	167
		(1.0.2.0)															
†Guinea grass (<i>Panicum maximum</i>)	80.0	2.6	0.5	9.4	12.0	3.5	1.6	1.0	0.3	7.6	7.0	15.2	80	12.9	19.2	165	70
		(0.7.3.5)															
Indian cane ..	77.0	1.5	0.2	11.0	8.9	1.4	1.0	0.7	0.1	7.9	5.2	19.0	80	11.2	15.8	236	80
Maize ..	82.0	1.7	0.5	9.0	5.6	1.2	1.0	0.6	0.3	6.0	3.1	16.2	83	8.7	12.2	286	104
Mitchell grass ..	74.0	1.4	0.4	9.3	11.3	3.6	0.9	0.5	0.2	7.5	6.2	28.2	76	11.1	16.4	330	81
		(1.2.1)															
Mixed pasture, poor ..	80.0	0.7	0.2	7.5	9.0	2.6	0.5	0.3	0.1	5.4	5.2	35.4	86	9.4	11.9	550	95
Mixed pasture, average	80.0	1.3	0.3	7.8	8.2	2.4	0.9	0.5	0.2	5.8	5.0	22.4	90	10.5	13.5	330	86
Mixed pasture, best ..	80.0	2.5	0.8	8.5	6.0	2.2	1.6	1.3	0.4	6.3	3.6	8.2	92	10.8	14.6	127	83
Oats, in flower ..	76.8	1.9	0.6	10.4	8.5	1.8	1.4	1.2	0.4	6.5	4.9	10.1	75	9.9	15.6	138	91
Panicum frumentosum	76.0	1.5	0.5	12.0	6.0	4.0	1.0	0.6	0.3	8.5	3.6	21.2	80	10.7	15.2	286	84

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Paspalum	75.0	2.3 (1.2-4)	0.4	8.9	10.4	3.0	1.5	1.2	0.2	7.0	6.2	11.7	80	11.8	17.4	138	76
Prairie grass	76.8	4.6 (2.7-6.4)	0.8	8.5	6.7	2.6	3.0	2.2	0.4	6.6	4.3	5.3	86	11.7	19.1	75	77
Rhodes grass	75.0	1.8 (1.5-3)	0.4	10.0	10.3	2.5	1.3	1.0	0.2	6.8	6.0	13.2	80	11.3	16.5	165	80
†Sorghum (saccharine)	80.0	2.1 (1.7-2.7)	0.6	9.7	6.2	1.4	1.2	0.7	0.2	5.8	3.3	13.6	79	8.1	12.5	236	111
Summer grass	72.0	1.4	0.3	13.1	10.0	3.2	0.9	0.5	0.1	9.3	6.0	31.0	85	13.6	17.8	330	66
†Sudan grass	78.0	2.3	0.2	11.0	6.2	2.3	1.5	1.1	0.1	7.5	3.8	10.5	82	10.2	15.3	150	88
Sugar-cane tops	72.0	2.6	0.7	12.9	10.0	1.8	1.7	1.2	0.3	9.4	6.5	13.7	80	14.1	20.8	136	64
Water couch (<i>Paspalum distichum</i>)	77.0	1.8 (1.4-2.3)	0.3	10.7	7.5	2.7	1.4	1.1	0.1	7.1	5.0	11.2	82	10.9	15.8	150	83
Legumes—																	
Cowpea vines	78.0	2.3 (1.7-3.6)	0.6	10.7	5.5	2.9	1.6	1.2	0.3	7.3	2.8	8.9	77	9.1	14.7	136	99
Field pea, in flower ..	83.2	3.5	0.6	5.6	5.9	1.2	2.4	1.6	0.3	3.7	3.0	4.6	77	6.8	13.3	103	132
Lucerne, young	81.1	5.6	0.8	6.2	4.4	1.9	4.3	2.7	0.4	4.7	2.0	2.8	87	8.8	19.3	61	102
Lucerne, in flower ..	76.0	4.5	0.8	9.6	6.8	2.3	3.2	1.7	0.4	6.3	2.9	5.9	79	9.2	18.0	97	98
Trefoil (Medic burr)	78.6	4.3	0.5	10.8	3.0	2.8	3.0	1.5	0.2	7.4	1.6	6.3	80	8.8	16.9	110	102
Wild lucerne (<i>Stylosanthes mucronata</i>)	76.0	4.3	0.3	9.7	7.7	2.0	3.0	1.5	0.1	6.4	3.8	6.9	80	9.4	17.9	110	96
2. ROOTS, TUBERS, &c.—																	
<i>Canna edulis</i> (Queensland arrowroot)	76.8	0.3	0.1	20.5	0.7	1.6	0.2	0.1	..	18.5	..	184	100	18.6	18.9	1,650	48
Carrot	83.0	1.0 (0.6-1.2)	0.2	11.9	1.6	2.3	0.7	0.3	0.1	11.0	0.9	41	87	10.6	14.0	550	85
Kohl rabi	84.6	1.2 (0.8-2.0)	0.1	9.7	3.0	1.4	0.5	0.2	..	8.8	1.5	51	90	9.4	11.6	825	96
Mangolds	85.0	1.2 (0.5-1.7)	0.1	10.0	2.3	1.4	0.7	0.1	..	9.0	1.1	101	70	7.1	11.9	1,650	127
Melon, pie	94.0	0.7	0.2	3.3	1.4	0.4	0.5	0.2	0.2	3.9	0.8	25	90	4.8	6.7	825	188
Potato, English	75.5	2.1	0.1	20.4	0.9	1.0	1.1	0.2	..	18.4	..	92	100	18.6	21.1	825	48
Potato, sweet	70.8	1.9 (0.5-2.8)	0.2	25.3	0.8	1.0	1.0	0.2	..	23.0	..	115	100	23.2	25.5	825	39
Pumpkins	83.0	2.2	0.9	9.0	3.1	1.6	1.5	1.0	0.6	8.0	1.6	11	85	9.7	17.7	165	93

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
4. SILAGE—																	
Maize ..	70.0	1.9 (1.5-2.6)	0.7	15.5	9.2	2.7	1.0	0.6	0.3	10.7	5.2	27.5	82	14.0	19.0	286	64
Sorghum ..	74.3	1.8	0.4	10.4	8.9	2.2	.9	0.5	0.2	7.3	4.9	28.6	78	11.5	16.6	330	78
Sugar-cane tops ..	78.0	1.3	0.6	9.4	8.0	2.7	.6	0.3	0.2	6.6	4.0	55	80	15.1	18.0	550	60
Wheat, thistles, and mustard	65.0	4.6	1.2	13.5	11.9	3.8	2.2	1.2	0.6	9.5	6.5	9.8	80	10.4	17.3	136	87
Dry Fodders.																	
5. HAY AND CHAFF—																	
Barley ..	9.5	10.4	2.2	37.2	31.8	8.9	4.8	3.4	0.8	23.2	18.0	12.6	66	30.5	54.9	49	29
Bush hay, good ..	7.5	6.1	1.9	38.6	39.8	6.1	2.8	1.9	0.6	24.0	22.6	25.2	66	32.8	54.9	87	27
Bush hay, poor ..	6.5	2.8	1.1	36.6	45.3	7.3	1.4	0.7	0.5	18.5	20.2	56.8	50	20.3	43.3	236	54
Cowpea chaff ..	8.1	15.7	4.3	31.5	26.6	13.8	11.2	6.8	1.9	19.0	13.5	5.3	67	28.6	64.2	24	31
Lucerne, before flowering	8.2	21.0	2.8	31.4	25.9	10.7	15.7	10.5	1.3	21.2	11.8	3.4	63	28.7	75.0	16	31
Lucerne, in full flower	10.0	15.0	2.8	33.2	31.0	8.0	10.3	6.6	1.3	20.3	13.9	5.6	57	24.6	62.7	25	37
Lucerne chaff, poor ..	10.0	16.6	0.9	39.3	25.2	8.0	11.3	7.3	0.4	24.4	11.3	5.0	57	24.8	64.8	23	36
Lucerne chaff, good ..	8.0	20.7	1.4	40.9	20.0	9.0	15.5	10.3	0.7	27.7	8.4	3.6	63	29.8	76.4	16	30
Wheat ..	10.0	9.4 (6-10)	0.8	47.4	27.6	7.8	5.2	3.6	0.4	27.6	14.6	9.2	67	24.4	46.0	46	37
Wheat chaff ..	12.0	4.7 (4-6.5)	1.7	42.0	30.4	9.2	2.1	1.5	0.9	26.1	16.1	28.1	67	29.2	47.4	110	31
6. STRAW—																	
Barley ..	8.5	3.5	2.0	38.4	41.0	6.6	1.0	0.7	0.8	20.2	22.0	62.5	46	20.5	46.2	236	44
Oats ..	9.2	4.0	2.3	42.4	37.0	5.1	1.5	1.2	0.7	19.4	21.0	34.8	43	18.4	45.5	136	49
Wheat ..	8.3	2.9	1.2	42.6	39.0	6.0	0.2	0.1	0.4	15.6	19.5	36.0	32	11.5	36.4	1,650	78
7. GRAINS, &c.—																	
Barley ..	14.0	8.6	1.5	71.0	2.7	2.2	6.5	5.9	1.2	65.0	1.6	11.7	98	73.2	85.4	28	12
Beans ..	14.3	25.4	1.5	48.5	7.1	3.2	20.1	19.3	1.2	44.1	4.1	2.6	97	66.7	101.1	9	14
Canary seed ..	11.5	15.2	5.4	57.7	5.1	5.1	11.5	10.6	4.3	48.7	2.9	5.6	97	69.6	88.4	16	13
Cowpeas ..	14.8	20.8	1.4	55.7	4.1	3.2	16.5	15.8	1.1	50.5	2.4	3.5	97	68.0	96.5	10	13
Kafir corn ..	9.3	9.9	1.4	74.9	1.5	3.0	7.3	6.8	0.9	56.2	0.8	8.7	95	62.0	77.2	24	15
Linseed ..	7.9	18.2	38.6	20.0	12.1	3.2	14.6	13.6	32.8	16.0	1.0	7.0	98	107.5	132.3	12	8
Maize ..	13.0	9.5 (8-13)	4.0	69.3	2.8	1.4	6.7	6.2	3.5	65.8	1.8	12.1	100	80.8	91.8	28	11
Millet (foxtail) ..	12.8	10.9	2.9	55.2	14.3	3.9	8.3	7.7	2.1	41.5	1.3	6.1	95	51.6	68.0	22	17

TABLE I.—continued.
Composition of Stock Foods—continued.

	CRUDE NUTRIENTS PER CENT.					DIGESTIBLE NUTRIENTS PER CENT.					PER 100 LB.				LB. OF FODDER TO SUPPLY.		
	Moisture.	Protein.	Fat.	Carbohydrates.	Fibre.	Ash.	Crude Protein.		True Protein.	Fat.	Carbohydrates.	Fibre.	Value.	Starch Equivalent.	Food Units.	1.65 lb. Protein.	9.0 lb. Starch Equivalent.
Dry Fodders.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
7. GRAINS, &c.—continued.																	
Millet, Japanese ..	11.5	12.6	4.8	60.8	8.6	3.7	10.2	9.1	3.7	45.7	1.2	6.0	95	60.1	80.2	18	15
Oats ..	13.3	10.3	4.8	58.2	10.3	3.1	8.0	7.2	4.0	44.8	2.6	7.8	95	59.5	75.8	23	15
Sorghum ..	12.8	8.9	3.6	70.8	2.0	1.9	4.6	4.1	2.8	60.6	1.2	16.5	98	70.0	79.2	40	13
Sunflower ..	8.6	16.3	21.2	21.4	29.9	2.6	14.7	12.8	20.2	15.4	11.0	5.9	92	80.0	111.7	13	11
Wheat, plump ..	13.4	12.8	2.0	67.7	2.4	1.7	10.8	9.5	1.3	62.2	1.1	6.9	95	71.1	93.0	17	13
		(7.5–16.6)															
Wheat, shrivelled ..	11.1	16.5	3.0	63.6	3.5	2.3	13.9	12.3	1.9	58.5	1.7	5.2	95	71.9	98.8	13	13
8. OILCAKES AND MEALS AND BY-PRODUCTS—																	
Barley branning ..	10.5	14.0 (11–15)	3.8	57.3	10.1	4.3	11.9	10.8	3.2	45.0	3.1	5.1	96	62.3	84.6	15	14
Barley meal ..	11.7	12.4 (10–13.5)	1.0	67.1	5.3	2.5	9.4	8.5	0.8	61.0	3.0	7.7	98	72.2	89.2	19	12
Bran ..	10.6	15.8 (13–18)	2.6	56.3	9.8	4.9	12.3	11.6	1.8	40.5	3.3	4.1	77	45.0	78.0	14	20
Brewers' grain, wet ..	73.0	7.5	2.0	10.1	6.0	1.4	5.5	5.2	1.6	6.2	2.4	2.3	86	14.6	25.8	32	62
Cocanut cake ..	12.8	17.2	7.5	46.7	10.5	5.3	13.5	13.0	7.2	39.8	6.6	4.9	100	75.9	102.5	13	12
Corn-cobs, ground ..	8.4	2.5	0.7	54.7	32.0	1.7	0.5	0.3	0.6	26.3	18.3	15.3	50	23.1	47.1	550	39
Cotton-seed meal, decort.	9.0	41.0	7.0	29.0	8.0	6.0	35.3	33.7	6.6	19.5	2.2	1.1	97	67.2	125.9	5	13

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Cotton-seed meal, undecort.	9.0	24.0	5.0	35.0	22.0	5.0	17.1	16.2	4.5	18.0	4.0	2.0	84	40.3	75.6	10	22
†Linseed meal (crushed linseed)	7.9	18.2	38.6	20.0	12.1	3.2	14.6	13.6	36.6	16.0	4.0	7.9	99	119.5	144.5	12	7½
†Linseed oil meal	9.8	25.5 (25-27)	8.0	39.2	11.0	6.5	22.0	20.9	7.4	31.4	4.5	2.6	96	70.4	108.7	8	13
Linseed meal (new process)	11.2	27.2	0.8	40.7	13.9	6.2	23.4	22.8	0.7	32.6	7.0	1.8	96	60.3	99.8	7	15
Maize meal	13.0	8.6 8.12	3.7	71.4	2.0	1.3	5.1	4.6	3.0	60.0	1.1	14.7	98	70.3	80.3	36	13
Malt sprouts (dried)	10.0	24.4	2.0	42.4	14.0	7.2	19.9	12.0	1.5	30.9	12.7	3.9	75	43.7	96.6	14	21
Millet meal	12.0	10.7	4.0	61.1	8.3	3.9	8.0	7.4	3.1	45.8	2.9	7.5	95	59.1	75.2	22	15
Peanut meal	10.7	47.6	8.0	23.7	5.1	4.9	42.8	41.4	7.2	20.2	0.4	0.9	98	75.2	144.9	4	12
Peanut cake (undecort.)	10.3	30.2	9.1	21.8	22.9	5.7	27.7	26.8	8.2	18.4	2.6	1.5	86	56.7	110.0	6	16
Pollard	10.4	15.7 (13.5-20)	3.6	61.4	5.8	3.1	13.8	11.9	3.1	54.0	2.1	5.3	86	63.6	97.1	14	14
Rice meal	10.1	11.5	11.3	55.0	4.6	7.5	6.7	5.9	9.5	50.1	2.3	12.2	96	74.8	89.2	28	12
9. VARIOUS FOODS—																	
Calf meal	10.6	16.2 (12-22)	7.2 5.11	55.9	4.5 3.9	4.6	13.1	10.0	4.5	45.0	4.0	5.9	86	58.3	91.3	17	15
Kubettes for sheep	10.0	13.8	3.1	59.5	8.3	5.3	11.0	7.5	2.8	42.0	4.5	7.0	86	51.1	79.9	22	18
Meatworks products—																	
Blood meal	10.0	75.1 (71-78)	1.5	7.7	..	5.7	67.0	58.5	1.3	5.0	..	0.01	100	63.1	175.6	3	14
Meat meals	8.0	54.4 (46-66)	8.0 2.14	6.1	..	23.5	48.3	42.0	7.0	4.5	..	0.5	100	60.8	143.3	4	15
Milk, cow's, whole	87.2	3.6	3.7	4.8	..	0.7	3.4	3.4	3.7	4.8	..	4.0	100	16.9	22.2	49	53
Milk, butter milk	90.8	3.6	0.8	4.1	..	0.7	3.4	3.4	0.8	4.1	..	1.8	100	9.2	14.5	49	98
Milk, butter, dried	7.0	34.5	1.1	49.1	..	8.3	32.5	32.5	1.1	49.1	..	1.6	100	82.3	132.9	5	11
Milk, separated	90.4	3.8	0.1	4.9	..	0.8	3.6	3.6	0.1	4.9	..	1.4	100	8.6	14.2	46	105
Milk, skim milk powder	6.0	32.7	1.6	52.0	..	7.7	31.0	31.0	1.6	52.0	..	1.8	100	85.0	133.3	5	10
Milk, whey	93.4	0.7	0.2	5.0	..	0.7	0.6	0.6	0.2	5.0	..	9.1	100	6.1	7.0	286	150
Molasses	24.0	2.2	..	63.8	..	10.0	1.0	..	..	57.3	..	..	88	50.3	59.8	8	18
Treacle cubes	9.9	27.1	4.0	38.7	15.3	5.0	23.0	21.8	3.6	25.4	4.0	1.7	85	49.8	95.6	8	18
Linseed nuts	10.2	27.7	6.2	37.9	11.5	6.5	23.8	22.6	5.7	30.1	5.5	2.2	95	66.8	108.8	7	13

REMARKS: Foods marked † contain Hydrocyanic acid.

TABLE II.

Percentage of Nutrients Digested in Stock Foods.

				Crude Protein.	Crude Fat.	Carbo- hydrates.	Crude Fibre.
By RUMINANTS—							
Pasture grass	..	..	..	56	46	61	62
Bush hay	..	..	..	35-61	49	49-65	46-64
Lucerne, green	..	..	..	77-83	37-54	65-77	32-47
Lucerne chaff	..	..	..	66-73	30-51	61-71	34-65
Green maize	..	..	..	56-78	40-83	66-78	59-75
Green sorghum	..	..	..	62	85	78	60
Wheat straw	..	..	..	0-26	17-44	29-40	42-59
Bran	..	..	..	80	51-60	40-88	37
Maize	..	..	..	58-84	81-99	84-100	46-100
Potatoes	..	..	..	23-88	..	82-99	..
Mangolds	..	..	..	44-89	..	91-100	0-43
Linseed cake	..	..	..	80-90	86-97	60-96	0-92
Cotton-seed meal, decorticated	..	..	..	84-96	93-100	44-71	0-100
Cocoanut cake	..	..	..	75-84	96-100	80-86	54-73
By HORSES—							
Bush hay	..	..	..	43-62	6-33	45-61	34-39
Lucerne hay	..	..	..	70-77	6-30	67-71	35-44
Wheat straw	..	..	..	12-44	..	4-56	3-14
Potatoes	..	..	..	88	..	99	9
Carrots	..	..	..	99	..	94	..
Oats	..	..	..	68-94	50-88	70-84	1-56
Maize	..	..	..	75-78	59-63	90-94	40-100
Linseed cake	..	..	..	57-88	53	94-98	..
By PIGS—							
Potatoes	..	..	..	57-88	..	97-99	28-83
Maize meal	..	..	..	84	74	94	41
Wheat	..	..	..	80	70	83	60
Bran	..	..	..	75	70	65	30
Mangolds	..	..	..	55	..	98	79
Linseed cake meal	..	..	..	86	80	85	12
Cocoanut cake	..	..	..	73	83	89	60
Meat meal	..	..	..	97	86	..	..
Sour milk	..	..	..	96	95	98	..

TABLE III.
Standard Rations.

Per Day and per 1,000 lb. Live Weight of each Animal.	Dry Material in Total Ration.	DIGESTIBLE NUTRIENTS.	
		Pure Protein.	Starch Equivalent
	Lb.	Lb.	Lb.
Horses—			
At light work	18 to 23	1.0	9.2
Medium work	21 to 26	1.4	11.6
Heavy work	23 to 28	2.0	15.0
Milch Cattle—			
Yielding 10 lb. milk	22 to 27	1.0 to 1.3	7.8 to 8.3
Yielding 20 lb. milk	25 to 29	1.6 to 1.9	9.8 to 11.2
Yielding 30 lb. milk	27 to 33	2.2 to 2.5	11.8 to 13.9
Yielding 40 lb. milk	27 to 34	2.8 to 3.2	13.9 to 16.6
Fattening cattle	24 to 32	1.5 to 1.7	12.5 to 14.5
Growing Cattle—			
2-3 months, 150 lb. weight	23	3.4	18.5
3-6 months, 300 lb. weight	24	2.8	14.7
6-12 months, 500 lb. weight	26	2.3	12.5
12-18 months, 700 lb. weight	26	1.8	10.5
Sheep maintenance diet	18 to 23	1.2	8.7
Sheep fattening diet	24 to 32	1.9	14.5
Lambs, wool breeds—			
5-6 months, 60 lb	27	3.0	16.4
6-8 months, 75 lb.	25	2.5	13.0
8-11 months, 80 lb.	23	1.8	10.7
11-15 months, 90 lb.	22	1.5	10.2
15-20 months, 100 lb.	22	1.2	9.7
Growing pigs, fattening diet—			
2-3 months, 44 lb.	44	6.2	33.8
3-5 months, 110 lb.	36	4.5	32.0
5-6 months, 145 lb.	32	3.5	26.5
6-9 months, 200 lb.	28	3.0	24.5
9-12 months, 285 lb.	25	2.4	19.8

Bureau of Sugar Experiment Stations.

THE WORK OF THE BUREAU.

AN INTERESTING REVIEW.

The subjoined review of the last Annual Report of the Director of Sugar Experiment Stations (Mr. H. T. Easterby) (a branch of the Department of Agriculture) recently appeared in the "International Sugar Journal" published in London.

This lengthy report has as usual much of interest, and is so packed with information that it is perfectly impossible to do it justice in a short article; it extends to about eighty folio pages. The author has made it a custom periodically to supply various details as to the progress made in the industry for a number of years; and now that Queensland is becoming one of the chief cane-sugar producers of the world it may be of interest to review some of the lines of progress. One of the most striking among these is the rapidity of the increase in the acreage under cane and the amount of sugar produced per acre. A table is presented as regards this for the past twenty-six years, which practically coincides with the period of activity of the Bureau. Without repeating this long table, we can perhaps obtain the best idea by averaging the figures for the first and last five years periods, as follows:—

	Acres cultivated.		Acres crushed.		Tons of cane.		Tons of sugar.	
1899-1903	..	105,719	..	69,945	..	932,137	..	101,031
1920-1924	..	204,543	..	113,867	..	2,202,402	..	283,139

It will at once occur to anyone reading these figures that, while the acreage crushed at the commencement of the period had not doubled at its conclusion, the sugar produced had during the same interval increased by nearly three times. This is a result of which the Bureau may well be proud. Great changes had, of course, taken place in the structure of the industry; there was the change from kanaka to white labour which was so confidently prophesied to bring about the ruin of the factories; the large estates were split up into a vast number of small plots, bringing into being a cane-farming population, independent of the mills; the latter were wholly remodelled and all small uneconomic ones were scrapped; the kinds of cane grown were completely altered. . . . A great deal of the most various scientific work was done by the Bureau, especially perhaps in the fighting of the pests in the fields, and a mass of advice was distributed to the farmers for their help and guidance. . .

One other point of great import is strongly commented on by the Director, and that is the lengthening of the crushing season. The natural season for crushing the sugar-cane the world over is when the active growth slows down in the dry, cold period: fortunately in most parts of the tropics the rains occur mainly in the summer, especially in regions of periodic rains. But the great masses of cane grown in the past two years have resulted in the milling season being extended after this cool, dry period into the hot, rainy season. Without more exact knowledge of the local possibilities one cannot suggest a remedy, but the Director appears to consider that it can be obtained, and it certainly needs attention. With the annual increase in the amount of sugar which has to find its level in the world's markets, it is obvious that, for the wave of prosperity which seems to be passing over the industry not to have a serious backwash, a great deal of fundamental work is opening up for the Sugar Bureau, and it is sincerely to be hoped that its warnings will be attended to in time.

SUGAR CROP ESTIMATE.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, places the present approximate estimate of this year's manufacture of raw sugar in Queensland at 380,000 tons. It may be pointed out that this is a considerable reduction in the estimates formed at the beginning of the year and is the result of the prolonged dry weather in nearly all the sugar areas of Queensland. This year there has been no regular wet season. If the dry weather persists it is quite possible that this estimate will be still further reduced.

Last season a good many of the Northern mills were obliged to crush into the early months of the present year, due to their large tonnages; this year, however, it is anticipated that all the mills should finish by the end of December.

CANE PESTS AND DISEASES.

The following report has been received (13th August, 1926) from the Assistant Entomologist, Mr. R. W. Mungomery, by the Director of Sugar Experiment Stations (Mr. H. T. Easterby):—

In the early part of July the Homebush and Sarina areas of the Mackay district were visited. The Homebush area was found to be comparatively free from pests of any serious nature, but Sarina, on the other hand, appears to have suffered one of the worst attacks in the history of canegrowing in that centre, and this year it stands out as one of the worst affected parts of the Mackay district.

This resulted from the incursions of the "greyback" cockchafer grubs (*L. albohirtum*), and it was augmented by the extremely dry weather conditions that set in from March onwards, when the grubs were reaching their third stage—the most destructive period in their life cycle.

Distribution and Effects of the Grubs (*L. albohirtum*).

The worst damage occurred in the West Plane Creek and Middle Creek areas, and to a lesser extent near the Plane Creek Mill. When riding along the fertile valleys between the hills, fields of cane with brown and dead foliage gave indication of the haunts of these pests and of the terrible toll that they were exacting. On one farm a 30 to 35 ton crop was ruined and lying down, and a great deal of it was unfit for the mill; this damage occurred on new scrub land that had been planted with cane only the previous year, as well as on the older land, but this damage on the new land was not nearly so bad as that which resulted on the lands which had been cropped for a number of years previously.

The majority of the cane crops affected by grubs were standing, and this was no doubt due to the drier season which made the grubs feed lower down in the ground at a depth where they encountered sufficient moisture for their development. Hence, although the deeper roots were eaten off, the surface laterals were intact and still able to support the stool.

Nearly all varieties suffered, but some to a more marked degree than others, and those affected included D. 1135, Black Innis, Cheribon, M. 1900 Seedling, Pompey, H.Q. 458, E.K. 28, and Q. 813. Some farmers were inquiring concerning more resistant varieties, but the two former canes are some of the best and most resistant to grub attack of the canes yet introduced, and, provided, of course, that they are free from disease, I would recommend growers to continue planting these canes in their grub-infested lands. Should they attempt to grow some of the other popular canes, the effects of grub invasion would be even more disastrous.

Although beetles are collected rather extensively during the fighting season—and a spirit of co-operation exists in this direction which other localities might well emulate—one hears of no fumigation being attempted in this district, and it is surprising that growers should be apparently so apathetic towards this phase of control work until the pest delivers its blow. Let them therefore be guided by their past bitter experience and order ahead a small quantity of either carbon bisulphide or paradichlor. (or both if they wish to test their relative efficiencies in this district) in anticipation of a similar state of affairs in the ensuing year, and let them remember that fumigation directed against the small first-stage grubs in the early part of the year (i.e., January or February, as the case may be) has a greater chance of success than if left until the grubs, being in their second and third stages, are larger and more able to resist such control measures.

R. Limbatipennis.

Records were given by farmers where this beetle had been seen plentifully in the earlier months of the year feeding on Shea Oaks and of their larvæ being present in the soil nearby. These latter seem to have all been accounted for by the flocks of birds which followed the ploughs and planter prior to and during planting operations, with the result that I had no complaints brought forward of these insects doing damage here, and good "strikes" seem to have followed the early plantings. Adults of this species were not in evidence at the time of my visit.

The Mound-Building Ant (*Iridomyrmex* sp.).

This insect was found on the headlands of some cane paddocks amongst blady grass (*Imperata arundinacea*), but was not doing the damage such as has been credited to this insect elsewhere. Several of these ants were in a more or less comatose state, probably hibernating, whilst several of the mounds were totally deserted.

Rhabdocnemis obscurus.

I am indebted to Mr. N. L. Kelly for bringing under my notice the occurrence of the cane weevil borer in some Badila at Carmilla, and I would advise growers so troubled to read remarks and observe precautions as outlined in my last month's report on this insect in the Mackay district.

Mr. N. L. Kelly, Assistant to Pathologist, reports (21st August, 1926):—

Proserpine.

Proserpine is at present afflicted more by pests than by diseases, and by drought more than either of these.

The beetle borer (*Rhabdocnemis obscurus*) was found fairly widely distributed in the Cannon Valley and Saltwater districts. There are many farmers who cannot distinguish this pest from the less dangerous noctuid moth borer (*Phragmatiphila truncata*).

1. The moth borer may be in the tip or middle, or less frequently in the butt of the stem; while the beetle borer is always to be found in the butt.

2. The larval stages—the stages in which they bore actively—are easily distinguishable; the larvæ of the former being a caterpillar, grey to light-purplish in colour with a red head, and having prolegs, legs, and anal claspers. It is about 1-1½ inches in length. The larvæ of *R. obscurus* is a rather stout grub, white, with a red head, and having no legs. It is about ½-¾ inch in length. The following varieties—viz., N.G. 15, E.K. 28, 7R. 428, B. 208, and N.G. 24B, were found infested by beetle borers. Those portions of the stick which had been bored were often considerably contracted in diameter. It is obvious that the selection of seed cane has not been carried out as carefully as it should have been, and that the tachinid flies liberated some time ago have been diminished or destroyed by the burning of the cane in which they were breeding.

The control measures that readily suggest themselves are:—

1. Harvest the infested fields as soon as possible, so as to minimise the emergence of the weevil.

2. Never plant infested sets, but burn these before the beetle merges.

3. If and when the parasites are liberated, allow at least half an acre of infested cane to stand over, in which the parasites may breed.

The grub of the greyback cockchafer (*Lepidoderma albohirtum*) had caused very serious losses to at least six farmers, in one case the damage being estimated at £150. In most cases many feeding trees—e.g., figs and ashes—could, with advantage, be destroyed; and a trial of paradichlorobenzene, a fumigant which can be obtained from several Brisbane firms, is strongly to be recommended.

The true wireworm (*Monocrepidius* sp.) was observed on a number of farms that were being prepared for the spring planting, and it will, doubtless, do considerable damage there. The fields in question had lately borne a heavy crop of grass and weeds, hence an obvious control measure—cultivate the fields better, thus removing the plants on which the *Monocrepidius* sp. (one of the click-beetles or skip-jacks) feeds. These—true wireworms—are Elaterids. The Chrysomelid “wireworm” (*Rhyparida limbatipennis*) was found on one field only. The season has not been favourable for a general emergence as early as July. The larvæ attacking each set were quite numerous—6-12. At the time of observation—a week after planting—they were still feeding on the ends, and had not attacked the eyes. The field was of a light sandy loam on a bloodwood ridge, and situated more than half a mile from the nearest shea-oak tree. This field had lately been under weeds, and many farmers are of the opinion, backed in one instance by observation, that *R. limbatipennis* can feed on other plants than the shea-oak; nevertheless, the demolition of these trees, coupled with the abnormal season, may considerably reduce the infestation on up-river farms this year. There is a certain amount of damage caused by wallabies, scrub turkeys, and particularly opossums in Up River and Kelsey Creek farms. One farmer estimates his loss, due to opossums alone, at 20 tons of cane, and thinks it desirable to have the season declared open for a longer period.

The Lower Burdekin District.

The Lower Burdekin district is infected to a very small extent with Mosaic, and far more considerably with Leaf Stripe. The cane-killing weed was found on about five farms at Home Hill. Top Rot, at present, is hardly to be found, though, in the summer, it will probably be as bad as ever. It may be that too much irrigation just before rain is a contributing factor.

Leaf Stripe.—It is rather disheartening to find that the majority of the farmers who are most seriously affected by this disease have not shown sufficient interest in their own affairs to read the reports, lately published, dealing with the five major

diseases, of which this, of course, is one. No farmer can judge the work of the Bureau who has not first tried active co-operation with us.

Leaf Stripe can be found in the Lower Burdekin practically wherever B. 208 is grown in quantity, and only in one badly-infected field had it spread to another variety—H.Q. 426. As no immune variety is known, this fact proves that secondary infection—by the fruiting bodies of the fungus being borne on the wind to, and germinating on, other canes is not very rapid. The wide distribution, and the frequent high percentage of infection, can thus be explained mainly by the lack of knowledge of the appearance and transmissibility of the disease, or by the carelessness of the farmers concerned.

1. The disease is widespread in the B. 208 grown at Airdale, Maidavale, and Klondyke. The losses caused by the disease vary with the variety of cane, and are sufficiently evident to all who grow B. 208 in those localities.

2. *Symptoms*.—The leaves of an infected stem are marked by curious stripes running from the base towards the tip. The stripes are few in number (say, 3-8), and are composed of many very narrow pale green or yellow discontinuous lines. The stripes alternate somewhat irregularly with stripes of the normal green tissue. Underneath the stripes is to be found a faint white fungus mycelium. On this are borne the "fruits"—conidia or spores—which in spring and summer bring about secondary infection, if most conditions prevail. When the stripes become older the tissues gradually die, and become compounded of red or brown longitudinal lines. In B. 208, in a badly-infected field, many stems may grow to abnormal lengths—coupled with a narrowness of the stem—and may be seen as freak stalks standing about 2 feet higher than those adjoining. Some farmers believe that these are the only diseased stems in the field, and again that the disease is a sign of general ill-health, or of the "running-out," of the variety. These beliefs are quite contrary to the facts, which are quite demonstrable.

3. *Control*.—(a) Eradicate infected fields after harvesting,—this often being advisable even with plant crops. If a crop is infected to a smaller extent than (say) 5 per cent., dig out infected stools when the cane is young (three or four months old). This prevents any secondary infection, and is very necessary if the field is to be used for seed. Avoid planting B. 208 in a field which has just carried a diseased crop, unless the preparation has been very thorough.

(b) If possible, choose as a source for seed, only a clean field. Several clean fields are to be found at Macdesme, Jarvisfield, Kalamia, &c.

Among the pests noted in this district were the Giant Termite (*Mastotermes darwiniensis*) on many farms, cane grubs on about six farms, and the bud moth (*Opoona glycyphaga*). The caterpillar of this moth was widespread around Ayr. It had destroyed 50 per cent. of the eyes in one field of H.Q. 426, and had bored into the stem in several cases. For description, see Bulletin No. 3, by Edmund Jarvis, of this Bureau (page 11).

NOTES ON A JAVANESE DIGGER-WASP.

By EDMUND JARVIS, Entomologist in Charge of the Meringa Laboratory.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (19th August, 1926) from the Entomologist at Meringa, Mr. E. Jarvis:—

The female specimen of *Triscolia rubiginosa*—mentioned in our last monthly report (May to June) as having been left at our Laboratory last month by Mr. H. Freeman—lived for twenty-seven days, dying on 11th July. Upon confining it in a suitable cage when first received, containing a grub of *Xylotrupes australicus* buried in damp soil, it deposited an egg (as was anticipated) on this new host. During the period 15th June to 10th July (26 days) it oviposited sixteen times on larvæ of this dynastid, known commonly by the name "Elephant Beetle." When caged with grubs of our cane-beetle, *Lepidoderma albohirtum* Waterh., however, it refused to lay eggs on them or to attack or paralyse them in any way.

Such indifference was not surprising, seeing that the latter destructive cane-beetle is not closely related to *Xylotrupes gideon* (the usual host of this wasp-parasite in Java), but belongs to quite a different sub-family, viz., the Melolonthidæ, the grubs of which feed on living vegetable tissue, whereas those of the Dynastidæ, which includes genus *Xylotrupes*, subsist for the most part on dead matter, such as humus, rotting wood, twigs, leaves, &c.

It is interesting to note, however, that nine of the eggs deposited by *rubiginosa* died between the dates 15th June to 11th July. The only wasp maggot, in fact, that attained full development (a female specimen) was that derived from an egg laid



PLATE 38.

1. Grub of *Xylotrupes australicus* (full size).
2. *Campsomeris tasmaniensis*, male (slightly magnified).
2a. head of same; 2b. anal segment of same;
2c. labrum of same.
3. Grub of *Lepidoderma albokirtum* (full size).
4. *Triscolia rubiginosa*, female (natural size).
5. *Campsomeris tasmaniensis*, female (slightly magnified).
6. *Triscolia rubiginosa*, male (natural size).
7. Grub of *Dasygnathus australis-dejeani* (size).

upon a grub of its Javanese host (*X. gideon*) during the passage to Cairns. This egg hatched on 19th June, the larval stage being found to occupy eleven days, at the end of which period this maggot started to spin. The following day, however, this larva suddenly turned black and died before able to construct its cocoon.

On 15th June a grub of *albohirtum* (our greyback cane-beetle) was caged with this parasite, and when examined next morning the grub displayed normal activity, not having been attacked by the wasp. This test with our cane grub was repeated on the following day with similar results.

In addition to its belonging to a different sub-family, as above mentioned, the fully grown grubs of *australicus* and *albohirtum* differ considerably in size (see accompanying photos, Figs. 1 and 3), which probably affords another reason why the latter grub has proved an unsuitable host for this Javanese parasite.

Similarly, the female of *Triscolia rubiginosa* is much larger also than that of *Campsomeris tasmaniensis*, the Australian wasp parasite of our cane-grub (see Figs. 4 and 5).

The larva of *Dasygnathus australis-dejeani* Mael. which, although belonging to a different genus from *Xylotrupes*, is a species of Dynastidæ, happens to be still smaller than that of *albohirtum* (see Fig. 7), so that the possibility of its being able to serve as a host to *rubiginosa* seems quite out of the question.

Six of the paralysed grubs of *X. australicus* died before the larvæ of *rubiginosa* (hatched from eggs laid on them by this parasite) had become half grown, with the result that these wasp larvæ died also, through inability to obtain suitable nourishment. Another of these grubs was destroyed by the entomogenous fungus *Metarrhizium anisopliæ*, while three others perished prematurely, possibly from mechanical injuries received when digging them up from under rubbish heaps. Up to the present (13th July) only three paralysed grubs of *X. australicus* carrying eggs and very small larvæ of this wasp remain alive.

Although the introduction of this female digger-wasp will not, it appears, prove of any value as a controlling factor affecting the economy of our cane-grub, some useful data of a scientific nature have nevertheless been obtained regarding its life-cycle and ecological relationships associated with those of certain of our scarabæid beetles in North Queensland.

The parasitic phase of natural control of any insect pest constitutes a study presenting such difficulties as only a trained entomological expert can hope to fully appreciate.

Many exceedingly complex factors, affecting what is known as the balance of nature, call for serious consideration, a perception or knowledge of which often demands the employment of special apparatus and original methods of scientific experimentation.

Even when fully satisfied as to the advisability of introducing any insect into another country, "in no case will it suffice," says Dr. L. O. Howard, "to turn the imported material loose, even under the most apparently favourable conditions. The original supply must be multiplied by breeding, and experimental loosings must be made."

In the present instance we find from investigations carried out at Meringa Laboratory, that although the grub of *X. australicus* is about the same size as that of *X. gideon*, the former is apparently unable to endure the sting given by this Javanese digger-wasp, and consequently dies before its parasitic larva has had time to attain full development. In one instance a grub of our Elephant Beetle succumbed a few hours after being paralysed. The grub of *X. gideon*, however, having doubtless become accustomed to the sting, remains alive from nine to eleven days, allowing ample time for the maggot of *rubiginosa* to become fully grown. In conclusion, it might be mentioned that we have not up to the present discovered any indigenous wasp parasite associated with *X. australicus*. *Campsomeris ferruginea* Fabr. might be large enough to attack it, but is very rare in the Cairns district. Fortunately, however, our large Elephant Beetle is of little or no economic importance.

Results of Experiment Plots, 1925-26.

These plots were laid down on red volcanic soil at Meringa by Mr. A. N. Burns (Assistant Entomologist), who has supplied the following details relative to the results obtained against our cane-grub, *Lepidoderma albohirtum* Waterh., by the use of various soil fumigants.

SUMMARY, &C., OF EXPERIMENTS.

The results of field experiments recorded below cannot be taken by any means as indicative of the best results obtainable from the fumigant used, nor yet even of the ordinary amount of efficiency from each dose in each case. Weather and soil conditions, cultivation, and even the erratic distribution of grub infestation in all the plots have been adverse factors governing the results obtained.

The weather has been abnormally dry, the precipitation to 31st May (1926) being only 37.88 inches as against 57.36 inches for the corresponding period of last year, a difference of 19.48 inches. At the time of putting down each experiment the soil was fairly dry and very hard, and the cane rows very weedy and unworked. Shortly afterwards it was all scarified, but only a couple of inches deep, and long since the weeds have grown to such an extent as in many places to outgrow the cane, and the soil has become consolidated and the surface encrusted. Some "wilted" stools showed no grub attack, wilting being caused by the dry weather and hard ground. The plots that are affected most by dry weather are the paradichlor., calcium cyanide, benzine and naphthalene, and benzine experiments, being all either on top of or on the slope of a hill.

(1) *Calcium Cyanide* ($\frac{1}{2}$ drachm doses).—This plot shows a difference of 36.7 per cent. in grub infestation between the treated and control areas in favour of the former. In both plots the cane had suffered last season from grub damage, consequently it was rather uneven; in many places the stools were stunted.

(2) *Paradichlor.* ($\frac{1}{4}$ -oz. doses, finely sifted; machine injected).—This experiment gives a result of 48.4 per cent. in the difference of grub infestation between the treated and control plots, in favour of the treated cane. The cane in both blocks was fairly even, but, being situated on the top of a hill, were badly affected by the dry weather.

(3) *Paradichlor.* ($\frac{1}{4}$ -oz. doses; hand injected).—With normal weather conditions and proper cultivation this experiment would undoubtedly have given excellent results. With the adverse conditions that prevailed, it gives a percentage of 49.3 per cent. less grub infestation in the treated cane than in the control block. The treated block can readily be observed by the number of green stools when compared with the surrounding cane, also by its much higher and more regular growth.

(4) "*See Kay*" (1-drachm doses).—The cane in both the treated and untreated areas was fairly even, and situated on lower ground than the preceding experiments. Grub infestation was also more sporadic. The treated cane showed a percentage of 7.6 per cent. less in the number of grub-infested stools.

(5) *Benzine and Naphthalene* (4-drachm doses).—This experiment gave a difference of 15.5 per cent. less grub-infestation in the treated cane as compared with the control block. Originally, however, the cane in the control was slightly more vigorous and less patchy than the treated cane.

(6) *Shell Benzine* (4-drachm doses).—This plot gave even better results than the mixture of benzine and naphthalene in saturated solution, showing a percentage of 16.6 per cent. less grub-infestation in the treated cane than in the control plot.

The above percentages, and to some extent those secured from experiment plots described in our last report (June to July) cannot, as already mentioned, be taken as conclusive evidence of the maximum efficiency obtainable from any of the fumigants employed. In order to secure conclusive data, the cane on such experiment plots should, before treatment, be of uniform growth and grub-infestation, both on the control and fumigated areas.

In the present instance, as previously reported by Mr. A. N. Burns, "Weather and soil conditions, cultivation, and even the erratic distribution of grub-infestation in all the plots, have been adverse factors governing the results obtained."

Digger-Wasp Notes.

It is interesting to record that one of the three small larvæ of *Triscolia rubiginosa* L. (the Javanese scoliid parasite described in our last monthly report) has managed to obtain sufficient nourishment from a grub of *Xylotrupes australicus* Thomp. to enable it to spin a cocoon. Judging by its small size (1, $\frac{3}{8}$ in. by $\frac{5}{8}$ in.), in the event of a wasp emerging from it, this will probably be a male specimen. Of the two remaining larvæ of *T. rubiginosa*, one died while still small; and the other, although growing big enough before death of its host-grub to attempt spinning, succumbed before able to complete its cocoon.

Study of this scoliid wasp must perforce be discontinued for the present. As matters stand, we have only two cocoons from which specimens may emerge about next January. One of these was derived during the passage from Java to Queensland from a larva of *rubiginosa* nourished on its true host, *Xylotrupes gidcon*. This

cocoon, which is a little larger than the one obtained by us from a larva reared on the grub of *Xylotrupes australicus*, may produce a female wasp. Both cocoons are being kept in moist soil, under conditions favourable for an ultimate emergence of these parasites.

Cane-Grub Infestation at Daradgee.

Early this month (6th August) the Assistant Entomologist (Mr. A. N. Burns) was instructed to visit Daradgee for the purpose of reporting on the more or less severe damage caused this season by grubs of *Lepidoderma albobirtum* Waterh. (greyback cane-beetle).

Infestation was practically confined to thirteen different selections, four of which were found to be very badly attacked; seven moderately to seriously infested; and four lightly affected.

The soil was red volcanic of a friable nature, and it was extremely interesting to note, from data supplied by Mr. Burns, that infestation in every area examined occurred either on hilltops or on slopes leading up to elevated ridges. The four most badly stricken areas (Nos. 1, 5, 8, 12 on accompanying map), which comprised about



PLATE 39.

120 acres of hilly country, were situated in the immediate vicinity of scrub land. Nos. 7 and 13 included collectively about 80 acres seriously attacked; Nos. 3, 4, 6, 9, 11, about 160 acres moderately affected; and Nos. 2, 10, 14, 15 about 40 acres showing light grub-infestation.

Remedial Measures.—With regard to methods of combating this insect, I should advise collecting of the beetles wherever practicable from feeding-trees or food plants known from past experience to be habitually frequented; and secondly, fumigation of infested land with paradichlor. or carbon bisulphide. In the present instance the soil around Daradgee and position of the affected cane lands happens to be particularly suitable for such treatment, and either of the fumigants just mentioned should

prove effective if applied at the right time. Any grower at Daradgee wishing to combat cane-grubs with carbon bisulphide or with paradichlor. is invited to apply by letter to this Station for full directions regarding how, when, and where to apply these fumigants.

Notes on Lantana Fly (*Agromyza lantanae* Frogg.).

An application was received last month from the secretary of the Local Producers' Association at Saltwater, Mr. J. H. O'Callaghan, for specimens of *Agromyza lantanae*, the little fly that exercises a controlling influence on the spread of the noxious weed *Lantana camara*. About 1,000 lantana berries, more or less, infested with larvæ of this useful fly were collected at Meringa and forwarded to Mossman, packed in a manner calculated to conserve moisture but prevent the development of mould during transit. It was gratifying to receive later on the following advice from the secretary of this association:—

“The seeds arrived in good order, and a few of the flies were hatched out; others emerged since. There was very little sign of mould.”

Although unable to prevent the spread of lantana in the Cairns district, this Agromyzid fly no doubt helps to keep it in check. When ovipositing in very young lantana berries, its larvæ are able to easily enter and destroy the soft immature seeds; while those produced from eggs laid in large green or ripening berries probably feed mostly in the pulp surrounding the seeds, finding the latter at such advanced stage of growth too hard to penetrate.

During 1924 two butterflies feeding on the flowers of lantana (*Thecla agra* and *T. echion*) were introduced into Fiji from Honolulu in order to supplement the work of this Agromyzid fly. At present, it is generally realised that the check lantana is said to have received in Hawaii is not entirely due to the activities of *Agromyza lantanae*, but to the combined action of many insects and other controlling factors.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Termites Attacking Cane Sets.

White ants belonging to the genera *Termes* and *Eutermes* have been doing noticeable injury this season to freshly planted sets, possibly on account of prolonged drought conditions.

Unlike *Mastotermes darwiniensis*, these smaller termites seldom invade the growing shoots or sticks above ground level, usually confining their attacks to the internal woody tissue of the sets and to the sprouting eyes. Control measures consist in dropping baits at intervals in the planting drills. A simple form of such poison-bait is made from—white arsenic, 1 lb.; megass, 35 lb.; molasses, 10 to 15 lb. Mix the arsenic in about 2 quarts of water, and while stirring briskly to keep it from sinking to the bottom gradually add the molasses, stirring continually until it has thickened sufficiently to hold the poison in suspension. Then stir in the megass, mixing same uniformly with the poisoned molasses.

How Growers can Check the Weevil-Borer.

Now that cutting is in progress one has a chance of locating the whereabouts of beetle-borers on invaded areas. The position of infestations, occurring perhaps for the first time, should be carefully noted, and the Entomologist at Meringa advised without delay. Tachinid parasites of this pest will be liberated by the Sugar Bureau free of cost on areas affected by borer grubs.

Careful Seed Selection Advisable.

During planting operations reject all sets showing tunnelling of beetle or moth borers. Avoid procuring seed from localities known to be badly borer-infested. It is by means of such diseased seed that this weevil often obtains a footing in clean canefields, and when becoming firmly established is not easily got rid of. Similarly, growers on the Lower Burdekin must endeavour when planting to prevent introduction of the “Giant Termite” (*Mastotermes darwiniensis* Frogg.).

Occurrence of Green Muscardine Fungus.

Grubs killed by this vegetable parasite are usually noticed during the months of April to June. A very late occurrence, however, was brought under the notice of this Experiment Station towards the end of July by an Innisfail grower. When attacked by this fungus, the grub, instead of decomposing, retains its ordinary shape

and, gradually hardening, turns at first white and then olive-green. At this stage of development, being filled with fungus roots or mycelium, it becomes mummified and can be broken into pieces. Growers should collect all such green crusted-looking grubs, crush them into powder and thoroughly mix this with about one hundred times the quantity of moist finely sifted soil. Sprinkle such spore-laden earth very thinly in furrows, when ploughing land that is usually grub-infested each season.

BORER-INFESTED CANE FARMS.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (23rd August, 1926) on Survey of Borer-affected Cane Farms in South Johnstone Mill area, from the Assistant Entomologist, Mr. A. N. Burns:—

Leaving Meringa on Monday, 12th July last, for South Johnstone, headquarters being at the Sugar Experiment Station there, a complete survey of the badly and moderately-badly borer-infested farms in South Johnstone Mill area was carried out on the three ensuing days.

Through the co-operation of the chief and assistant cane inspectors, and their kindness in placing a rail motor at my disposal for two days, much ground was easily covered, and farms in the outlying portions of the area were visited.

The first day—13th July—was spent in visiting farms at Basilisk (No. 6 branch), the "Five Mile" (No. 1 branch), Kalbo Junction, and a small portion on the Nerada line. Taken as a whole, borer infestation in general is not very bad, though several farms visited were *individually* seriously affected. On one farm not only do the borers occur plentifully on the river flats—in which localities they were only found—but also on the red-soil hill adjoining. Nerada line may be said to be free from borers, but in many places on the red-soil highlands along it, grub damage may be seen. Evidence of grub injury was also observed on several other farms on No. 1 and No. 6 branch. Rat damage was not serious, and was most noticeable in cane on the river flats—especially on the fringes adjoining the long grass and undergrowth growing on the river banks.

14th July (Wednesday).—Visited farms on No. 2 branch, Myer's Siding, Main line, and Mill area. The Main line is practically free from borer attack and also grub attack. No. 2 branch and Myer's Siding had several farms badly affected by borer. At that place there is standover cane, unpermitted, which is very badly borer infested; several adjoining farms are consequently attacked on the edges of the cane adjoining. Taken as a whole No. 2 branch, from Myer's Siding on, may be said to be the worst borer attacked branch, though, with one exception, the centres of attack are confined to the cane in immediate vicinity of the edges of Mena Creek. Grub infestation is not bad on No. 2 branch; several farms showed small localised areas attacked near the tops of red-soil hills.

15th July (Thursday).—A very large area, including many outlying farms, was covered. Japoon, part of No. 3 branch, Sim's Siding, Austin's Siding, Anotti's Siding, Silkwood, the Eight-mile, Wylie's Siding, and No. 4 branch, and the Japoon end of the main line, was traversed. On No. 3 branch, one farm only, that of Messrs. Spitiri and Bonana, showed borer attack moderately badly on a rise from a creek bank. The main line and sidings above named were very free from borer though in places grub attack was noticeable on red-soil highlands. At Japoon, borer infestation was only moderately bad, one farm on the edges of Liverpool Creek showing the worst damage in a small patch of standover cane. No. 4 branch, at the extreme end, was fairly badly affected. Several acres of standover cane, unpermitted, are badly attacked. This area seemed free from grub attack, being flat country, and grey and brown soils. Silkwood area may also be mentioned as being fairly free from beetle borers. In this area grub attack is slight—the ground being level and the soil grey and brown.

ENTOMOLOGIST'S ADVICE FOR SEPTEMBER.

By EDMUND JARVIS.

Army Worms again on the Warpath.

Caterpillars of the so-called "army worm" (*Cirphis unipuncta*) appeared in great force at Moolaba recently, 16 acres of young cane planted last May being more or less damaged.

Growers should be on the lookout for the occurrence of this pest on areas under ratoon and plant crops from 1 to 2 feet high. Low-lying flats bordering river banks are very liable to invasion, and when severely attacked complete destruction of the heart-leaves may follow.

These caterpillars usually feed at night time, hiding during the day amongst the unfolding leaves, their whereabouts, however, being invariably betrayed by numerous pellets of excreta or powdery fragments of same scattered among the central leaves or on the ground close to stems of affected plants.

Control measures are seldom necessary unless the caterpillars, when first noticed, happen to be still quite small or about half grown, and the cane very noticeably damaged.

In such cases no time should be lost, as such larvæ generally do the greatest injury during the fortnight preceding their maximum development. The following poison-bait is said to have given good results:—Eran 20 lb., Paris green 1 lb., syrup 2 quarts, orange or lemon, three fruits (finely ground), water $2\frac{1}{2}$ gallons. These components should be well mixed together to form a fairly thick mash; fragments of which, about the size of a walnut, are scattered between cane rows close to the plants in the early evening. Another good method is to spray affected plants with lead arsenate in the proportion of 1 to 2 lb. arsenate to 50 gallons of water. This strength, if correctly made, will not burn the foliage.

Beetle Borer Displays Increased Activity.

As the season advances, accompanied by milder temperatures, damage due to weevil borers is gradually becoming more noticeable.

Inspection of cane growing in low-lying situations, or where this pest has previously occurred, should be carried out, and any infestations met with made known to the Entomologist at Meringa Laboratory.

Large Moth Borer in Evidence.

Caterpillars of the large moth borer (*Phragmatiphila truncata* Walk.) are responsible at present for the occurrence of "dead-hearts" among the first shoots of young ratoon and plant cane.

This insect is common at times in the Burdekin district; local infestations being recorded also from South Johnstone on certain low-lying areas. Such "dead hearts" should be cut out when noticed, care being taken to sever these diseased shoots at a point about a couple of inches below ground level, as the central tunnel of the caterpillar generally extends to within an inch or so of the set. Needless to say, these shoots must be crushed or otherwise destroyed. By following out this simple control method at the beginning of the season most of the moths which give rise to the second and much larger brood of caterpillars will be put out of action, and injury of this nature reduced to comparatively harmless proportions.

FIELD REPORTS.

The Central Field Assistant (Mr. E. H. Osborn) has forwarded the following report to the Director of Sugar Experiment Stations, Mr. H. T. Easterby (16th August, 1926):—

Rollingstone to Toobanna.

Right throughout the Herbert River area from, say, Rollingstone to Halifax, dry conditions prevailed.

				<i>Rainfall Figures.</i>				
				Rollingstone.		Ingham.	Halifax.	
				In.		In.	In.	
January	..	..	..	7.14	..	2.68	..	3.96
February	..	..	..	18.00	..	16.80	..	21.90
March	..	..	..	1.80	..	8.76	..	4.08
April	..	..	..	2.50	..	1.82	..	1.37
May	..	..	..	..	..	0.25	..	0.53
June	..	..	..	..	..	0.52	..	0.53
July	..	..	..	..	..	0.52	..	0.59
				29.44	..	31.35	..	32.96

Cane was very patchy, and a long way below last year's crop. Seventeen thousand tons were expected from eighty-eight growers, but it did not seem likely that these earlier figures would be realised under such unfavourable growing conditions.

About 400 acres had been planted for next year with, may be, another 100 in course of preparation. A large proportion of this planting is, however, yellowing rapidly, and unless rain comes soon will die out, making the prospects for 1927 very doubtful.

Among the centres inspected was Toobanna. This is now a particularly busy station with a fleet of motor lorries handling the cane.

Ingham.

Despite adverse weather conditions the town of Ingham is making steady progress, and most of the recently erected buildings are a credit to the district. Two fine new hotels have been opened and two more are nearing completion. The two local mills treated about 444,000 tons of cane between them last year.

New residences and wireless plants were new features noticed. The Government Radio Station 4 Q.G. is popular. Roadmaking is also being carried out systematically.

Crops.—Earlier mill estimates may not be realised. The harvest will be somewhere near 320,000 tons, against the large total of 444,000 tons of last year.

Besides having the dry weather to contend with, a few very severe frosts experienced at the end of July gave canegrowing on exposed places a severe setback.

Arrowing seemed to be more prevalent than usual in nearly all varieties, but exceptionally so in H.Q. 409. Some remarkably good strikes of young plant were seen, especially in ground that retained the moisture. N.G. 15 (Badila), Q. 813, Goru (N.G. 24), Korpi, Nanemo, H.Q. 409, and Oramboo all had made a good start. Sugar contents of the cane were also appreciably below last year's.

Cultivation.—A good deal of ploughing was being carried out, both by tractor and horse power. Of the former there are many types in use. The land has had more work put into it than at any other time, most of the soil being in a really good tilth.

Varieties.—N.G. 15, Q. 813, N.G. 24 and 24 B, H.Q. 409, Korpi, Nanemo, and Oramboo are the main canes grown upon the Herbert, and among these the proportion of Q. 813 for poor land has increased considerably of late years. Some splendid strikes of this cane were noticed in one case upon a very dry and poor block of ground. H.Q. 409 is also grown to a large extent upon land considered too poor for N.G. 15, and some good crops were noticed. Goru, where seen growing in sandy soil, looked extremely well for such a dry year. Good but patchy crops were also noticed of Korpi, Nanemo, and Oramboo, especially the latter.

B. 208.

A few acres of this cane were seen growing at Helen's Hill, and these seemed free from disease, but the owner was warned not to let any go away to other farms for seed unless thoroughly examined by a competent person.

Diseases and Pests.

Very little loss was noticed this year, an odd borer-infected stick only being seen. Grub damage was also very slight, while rats had only been troublesome in a few isolated areas. Near Yuruga a species of weed resembling the Cane Killing Weed of Proserpine, but in such a very withered state that it would be hard to identify it definitely, was seen in some plant H.Q. 409 on a poor forest soil. Numerous stools were in a very stunted and half-dead condition, while others had quite perished in the close vicinity of which this weed was growing.

Top Rot was rather prevalent in plant Badila on a couple of farms on the Lower Stone River. One farmer was getting plants from an area in which Top Rot has not so far occurred.

Gum.—This disease has not, so far, done much damage this season. In dry weather it is hard to identify gum in its earlier stages. In its later stage it was only seen in a couple of places—at Toobanna on the railway line and near Gairloch—in each case in H.Q. 426 ratoons. It looks as if the barring of this very susceptible variety by the company has given gum a decided check. One bad practice is still being carried out by Italian growers on the river, which is not calculated to make gum detection easier, and that is the habit of planting the whole stick of cane in the drills and afterwards cutting up with a cane knife, despite the many warnings that they have had against the practice. The company is propagating seedlings at its Macknade nursery to be grown afterwards near gum-infected cane with a view to obtaining a variety that may be immune to the disease. This interesting work is under the supervision of Mr. K. Gard.

The Northern Field Assistant, Mr. A. P. Gibson, reports (20th August, 1926):—

Innisfail.

Progress.—The progress of the industry may be judged by the growth of its dependent towns. Innisfail is rapidly covering more ground; streets and pavements have been improved, three reinforced concrete hotels under construction are nearing completion, two more concrete bridges are under way, one replacing the old structure at Bamboo Creek, the other spanning the upper waters of the North Johnstone River at a point adjacent to the company's tramway bridge.

Weather.—Moderately warm days, chilly nights, and scanty rainfall cover the month's climatic conditions. Only 61.64 points of rain had been recorded for the first seven months of the year; this fall is far below the mean. The grass temperature on the 26th July was 36 degrees, when slight frosts were experienced, a most unusual occurrence in these parts.

The Crop.—The outlook for the district is not so bright. Dry weather has had a bad effect on the general crop; this, accompanied by early arrowing, grub destruction in parts, and late harvesting obviously is responsible for its backwardness. Some of the mills will finish quite early, with the probability of still a further drop in mill estimates. The highland crops are much lighter than usual, but excellent crops of Badila were seen on some of the richer alluvial deposits. Most of the carry-over crop and grub-eaten cane had been harvested; the former contained much damaged or dead cane and its quality and weight proved disappointing. The semi-dry season has favoured the planter on the moister lands. Badila is the favoured variety; 98 per cent. of the crop milled at Mourilyan last year was of this kind. Pompey should only be grown on lands too poor to raise Badila.

Harvesting.—Ideal conditions continue for this work. Generally the crop is disappointingly short, many paddocks are cutting below early estimates; in consequence the cutting is proceeding rapidly. Grub affected and carry-over fields have been harvested first. The cane coming forward for treatment appeared fresh; it was decidedly cleaner than that of last crushing, and much is being loaded double on the trucks because of its shortness. In places a great quantity of cane is tumbling off the trucks in transit to the mills; such losses are mainly due to improper loading, the failing to tighten holding-down truck chains just prior to locos. taking delivery, and sometimes faulty rolling-stock. Parts of the volcanic red soils are rough, loggy, and have outcrops of basalt; on such lands the removal of the crop is difficult and more costly. High cutting was noted in some fields.

Crushing.—Mills are working well on the 1926 crop, big weekly tonnages are being treated, and at times the cane supply is inadequate. The bulk of the cane being milled is unburned and clean; such improved conditions should be welcomed, for this is of untold benefit to planter and manufacturer. The quality of the cane is exceptionally high. The South Johnstone factory is railing away its molasses in 200-gallon tanks and emptying same along its tramlines. Early mill estimates have been reduced some 45,000 tons, leaving at present an approximate district total of 590,000 tons to be crushed. Goondi and Mourilyan mills should have no difficulty in completing their crops before Christmas. Slender hopes exist of the South Johnstone mill finishing its present given estimate this year, unless the Tully mill renders greater assistance; at present it is relieving it of some 900 tons weekly. Boats and railways are removing the large quantity of sugar at the several mills almost as quickly as it is manufactured.

Ratooning.—The new crop is ratooning all the way from poor to good. Conspicuous yellow leaf patches were again noted, more particularly on the volcanic red soils, due to apparent deficiency of some plant food, probably potash, possibly exhausted from such soils by some scrub tree or trees. The harvested areas generally receive one of the following early treatments:—

- (1) Off-barring: After burning trash, the nearby soil is turned away from the stool by use of the plough and the interspaces subsequently levelled and cultivated by horse or power implements.
- (2) Volunteering: Trash is permitted to remain as when cut.
- (3) Relieving: The trash is drawn off the stubble only.
- (4) Rolling: Trash is rolled to interspaces from one to three^o drills apart, according to the density of same; this operation costs about 30s. per acre.

Satisfactory results are obtained from the latter two mentioned operations; subsequent husbandry is minimised, humus is added to the soil, but the danger of fire is great, and some growers declare that the cane borer destruction is more pronounced where this practice is followed.

Cultivation.—Some growers have reached the advanced stage of success, not because of working land of quality, but because they follow a judicious system of cultivation, coupled with the selection of vigorously growing and disease-free cane

when planting, but other farmers are not so careful. Our sugar lands appear lacking in organic matter, therefore it seems imperative to conserve more of our trash and keep on growing leguminous crops; this is becoming more necessary as our lands become older and poorer. It is very poor agriculture to roughly plough a field just harvested twice and immediately replant. A disc harrow drawn across highly cut stubbles often gives beneficial results. Various causes are responsible for cane stools working to the surface; subsequent improved crops are made possible by throwing soil on to them.

Planting.—A large area had been and is being planted; that completed early has made slow progress, but has greatly improved since some rain of recent date. Placing full length cane in drills and cutting them into sets as they lie is often done. This should not be encouraged, for reasons given in previous reports. We can only urge the growers to do something that will help arrest some of the possible causes of the ever-rising tide of pests and diseases. Sets being used for planting in some instances were far from perfect.

Manuring.—Mill compo. and megass ash had been distributed over resting areas. Various mixtures were being added to plant and the new ratoons.

Pests.—Grubs, weevil borers, and rats, to a lesser degree, have caused much destruction of this year's crop. The first-named has accounted for estimated district loss of 18,000 tons. Most of the grubs have gone down to pupate. The weevil borer is working its hardest, being severe on individual farms. This pest is to be more dreaded than the cane grub, therefore it is highly desirable that it be controlled prior to its becoming fully entrenched. A breeding tachinid fly cage is under way at the South Johnstone Sugar Experiment Station, and the farmers are proposing to erect others throughout the area; this should be good news to the grower and may have the desired effect of arresting or wiping out what is a very serious pest.

Diseases.—Leaf scald was observed to a lesser degree in this area than most northern sugar areas. Spindle Top (or Top Rot), so named because of its very thin top, is widespread, being particularly noticeable on all classes of soil throughout Mourilyan and Tully areas, and, like arrowing, marks the end of growth of affected canes. The lengthy stretches of dry weather have probably been responsible for this. Its presence may be manifested in one or more canes of affected stools, but not necessary in all. It may easily be detected by purple topped leaves, dead hearts, dwarfed tops, fine top, the shooting of topmost eyes, and the forming of aerial roots. Such affected canes apparently are not healthy, therefore it is advisable to discard them when planting. The prosperous Upper Daradgee area was inspected; the make up of this soil is alluvial, mainly adjacent to the river and fringed by the usual volcanic red ridges which extend back to the nearby ranges. Here soil, rainfall, and climate combine to raise the finest of corps. Badila is wholly grown.

Farmers should avoid leaving standing cane intended for plants on the fringes of scrubs and creeks, for here it is more subjected to destruction by pests.

The Southern Field Assistant, Mr. J. C. Murray, reports (17th August, 1926):—

Bundaberg.

In the Bundaberg district, practically all the cane in the belt stretching from Lover's Walk through to Spring Hill was affected by frost. D.1135 probably suffered the worst. M.1900 Seedling showed a certain degree of resistance; also Q.813, H.227, E.K.28, Q.970. Taking the severity of the frost into consideration, it is surprising that more damage was not done, especially as the cane was backward and lacked vitality. On the river there was no noticeable damage. A fungus, perhaps induced by the severity of the winter, was heavily attacking the cane in places. It resembled the well-known "cane soot" of sugar-cane. In taking plants from areas where this occurs, select good, sound cane, as free from cracks as possible. It would be a wise precaution to soak them for a few hours in a weak formalin solution, say, half a gallon of formalin to fifty or eighty of water. This would be hardly practicable for a big bulk of plants, but would be of use where a farmer wishes to increase his supplies by planting from a variety plot.

Mount Bauple.

A very fair crop will come from Bauple this year. The district generally has a prosperous appearance, the extension of fruitgrowing and road construction helping to deepen this impression. There should be a big future ahead of this district in relation to citrus fruits and bananas, the fine easterly aspect of the jungle-clad hillslopes being particularly favourable.

Three varieties showing well in the Bauple areas are E.K. 28, Q. 813, and H.Q. 285. Growers are recommended not to plant areas that are unwieldy, but to farm efficiently on lands within their financial resources. Sugar farming is now a highly specialised industry with good rewards for those who treat it as such, but with small results for those who do not. A farm of moderate size, adequately drained, tilled, and fertilised will produce more than a much larger area indifferently farmed. Also to make a success of a farm it must be treated as a life work, not as a "get-rich-quick" project.

The writer has frequently been asked what was the effect of the white patch or "butterfly" on the leaves. This is quite a harmless condition. Leaves should not show this "butterfly" too much at cutting time, because from the writer's field observation a too-frequent exhibition of these white patches synchronised with a low or medium sugar content.

There is still a little Mosaic in the Bauple district.

Mary Valley.

There is very little cane growing in this district, farmers not generally considering it a paying proposition. Splendid crops can be grown here, but distance from mill and other factors are proving too much for the farmers.

Beenleigh.

Regarding varieties, methods of cultivation, &c., there is nothing fresh to comment upon since last visiting this district. Farmers are recommended to take drastic steps with regard to the Fiji disease in the D. 1135; it is in every block the writer has so far visited. When cutting, the D. 1135 must come out. Q. 813 can take its place. Fiji disease, where it occurs, absolutely kills the cane, and as it is only just starting in Queensland, drastic measures must be used for stamping it out. Farmers will be expected to act on these recommendations.

METEOROLOGY AND AGRICULTURE.

W. R. BLACK, B.Sc., Ministry of Agriculture and Fisheries (Great Britain).*

Climate, definable as the average of meteorological conditions over a long term of years, has a predominant influence upon agricultural production. As crops differ in their individual demands for warmth, rainfall, and sunshine, so an excess or deficiency in the requisite quantities of these essentials causes injury and possibly complete failure. Not less important than the requisite seasonal quantities of these meteorological elements is their incidence in the life of crops, since as a general rule there are critical periods or stages in growth at which certain quantities of rain, sunshine, or warmth are particularly necessary. Climatic conditions are often found in "zones," the effect upon vegetation being most clearly exemplified in continental regions, such as North America, with its cotton, maize, and wheat belts. In England, as a result of the climatic differences, corn crops are found mainly in the eastern and grassland in the western counties.

In addition to their direct action upon crops, meteorological elements have an indirect influence, bearing chiefly upon cultural operations and upon the pests and diseases to which crops are subject. Obviously, if ploughing, seeding, and harvesting operations have to be undertaken when weather conditions are adverse, the chances of a successful crop are lessened. Temperature and humidity at various periods in the life-history of insect and fungus pests are all-important to the development of these pests, the effect being accentuated if at the same time the weather conditions adversely affect the growth of the host crops or bring them to a susceptible state at the right moment from the point of view of attack. The weather also indirectly influences crop growth through its effect on the soil, rainfall above a certain amount leading to the washing away of plant nutrients.

To a limited extent it is possible to modify climatic influences locally, *e.g.*, by draining marsh land; by cutting down forests; by irrigation to counteract deficiency in rainfall; and by the use of smoke screens, artificial heat, or flooding to guard against frost. Certain crops also, such as glasshouse crops, can be grown profitably under artificial conditions that make them almost independent of climate. In general, however, it is true to say that there is no possibility of so changing climate as to render it more suitable to particular crops. Such crops and their varieties must be chosen, and farming operations so ordered, therefore, as best to support the existing climatic conditions.

* In "The Journal of the Ministry of Agriculture" (Great Britain) for July, 1926.

Use of Meteorological Observations in Practical Agriculture.

The crops and operations customary in any given district have been adopted, presumably, after long experience based on past successes and failures. It is impossible, however, to be certain that such crops and operations are indisputably the best, because one cannot be sure that all alternatives have been tried, a consideration which gains in importance when it is remembered that modern agricultural science is ever placing fresh discoveries before the farming public. The practical man should know within a reasonably short time what farming practice can be adopted, what new crops can be grown, and which of the discoveries made by research institutes can be put into operation in his own particular case with chances of success. As a recent example may be cited the introduction of the sugar beet crop, in the case of which the weather conditions which favour good yield and quality must be known and compared with those obtaining in a district in which its introduction is contemplated.

Careful and detailed data relating to meteorological conditions experienced throughout the life of crops, and their effect on growth, are thus required if new agricultural practices and the results of agricultural research are to be given their full value.

Use of Meteorological Observations in Agricultural Research.

A study of meteorological conditions is necessary for the carrying out of research. The *plant breeder*, for example, desires to know the critical stages in a plant's growth so that he may breed varieties with characteristics that will render them more resistant at those critical periods (whether to direct adverse weather conditions or insect and pest attacks), or characteristics that will predispose those critical periods to occur at times when weather conditions are likely to be favourable. An outstanding example of fitting a crop to climatic conditions is afforded by the breeding of "Marquis" wheat in Canada; this wheat matures a few days earlier than standard varieties grown up to the time of its introduction; these days were critical days, however, and the wheat could be grown in districts with a risk of earlier winters, so that a great expansion of the area under the crop in that country resulted. For the same reason "Marquis" escapes much of the rust which used to ravage "Red Fife" and its other predecessors.

The *worker on soils and manures* desires to know how, with any given soil, the effect of manures both on yield and quality of crop varies with meteorological conditions, so that he may give advice to the practical farmer in accordance with the weather experienced and that to be expected from a study of foregoing seasons. Thus from a study of soil and weather the soil worker may be able to advise that a dressing of nitrogenous manure applied for wheat in winter will need to be repeated in spring; that with the prospect of a large spring rainfall muriate of potash can be equally well applied to potatoes as sulphate of potash; that, as the summer is wet, basic slag may be applied with every prospect of increased keep from pastures in the autumn.

The *soil physicist* desires to know the effect of meteorological factors on those soil conditions (*e.g.*, soil moisture, plasticity, cohesion, &c.) on which soil tilth depends, so that he may assess the relative efficiency of different cultural operations, both from the practical and economic aspects. He also needs this information to supplement and check his laboratory investigations on the physical properties of soils.

Apart from its intrinsic value to soil science, this knowledge is of the greatest importance to the *agricultural engineer*, as it enables him to base his implement designs on definite information in place of empirical observations. Detailed local data regarding rainfall, humidity, temperature, sunshine, and wind are directly of value to the agricultural engineer in investigations of the use in agriculture of water and wind power and of drying apparatus.

The *plant pathologist* is concerned with the effect of climatic conditions on insect and fungus pests in order that control measures may be devised, and, as a result, and with observations of meteorological conditions at any place and time, practical growers may be advised as to the necessity, or otherwise, of adopting these measures. The value of observations on the effect of weather on outbreaks of epidemic diseases of plants is shown by work in Europe and America. In France and Italy it has been found possible, by careful meteorological, crop, and pest observations, successfully to forecast outbreaks, and an organisation has been set up both at Montpellier and at Turin for the purpose of warning growers when to spray.

Considerations such as the foregoing show how necessary it is for the advancement, both of the practice and science of agriculture, that careful and detailed meteorological observations should be carried out concurrently with observations on the growth, yield, and quality of crops, their response to manures, their resistance to attacks of insect and fungus pests, &c.

Use of Meteorological Observations in Forecasting Yields.

Observations of meteorological data on the one hand, and of crop data on the other, may prove to be of value, among other purposes, for that of forecasting yields of crops. Statistical methods have been evolved whereby, given sufficient data of both kinds, the two can be correlated and the effect of meteorological elements, singly or in combination, on the crop yields ascertained. It may therefore be possible in future, by using the meteorological data collected in any season and applying "correlation coefficients," worked out by statisticians, to estimate the probability that the crop yield will be above or below a certain amount. This aspect of agricultural meteorological work is the one above all others that has made a special appeal abroad. The value of forecasts is likely to be increased proportionately to the length of time that they can be made in advance; the date at which they can be made depends, of course, largely on the times of critical periods in the crop's life. One aspect of crop weather forecasting, which has received some attention in the past, is that of weather cycles or periodical repetition of weather conditions; such cycles are stated to have been discovered, and the search for fresh ones is being pursued. Other things being equal, repetition of meteorological conditions may be expected to lead to reproduction of agricultural phenomena.

Agricultural Meteorological Work Abroad.

This country has hitherto been very much behind others, notably Russia, the United States, and France, in the study of agricultural meteorology. A Bureau of Agricultural Meteorology was established in Russia as far back as 1894 for the organisation of agricultural and horticultural meteorological stations to determine the relation of weather to crop production, and by 1912 observations were kept at eighty-one experiment stations. An Agricultural Meteorology Division of the United States Weather Bureau was formed in 1916 for the purpose of organising agricultural meteorological stations at the chief agricultural experiment stations of the country. A similar scheme was begun in Canada in 1915. Stations on the Russian plan have been established quite recently in Italy. In France an "Agricultural Physics and Meteorology" service was established in 1912, and when, in 1921, the new French agricultural research organisation was set up, agricultural physics and meteorology stations were made an integral part of this organisation; much practical use has been made in France of work in which meteorological data have been related to outbreaks of plant diseases. In Hungary and Japan agricultural meteorological organisations have been set up with the express task of furnishing forecasts of crop yields. In Brazil an agricultural meteorological service was formed in 1921; agricultural meteorological stations have been established in that country both at agricultural experiment stations and at climatological stations.

Agricultural Meteorological Work in Great Britain.

Except for isolated pieces of research on, for instance, the correlation between the weather and the yield of wheat, by such investigators as Mr. R. H. Hooker and Sir Napier Shaw, and work by Dr. R. A. Fisher on the effect of weather on the yields of the experimental plots at Rothamsted, no serious attention was given in this country to agricultural meteorology until 1922; in that year a committee, appointed by the Agricultural Research Council, under the chairmanship of Sir Thomas Middleton, suggested that studies of three types should be encouraged in this country, viz.:—

- (1) General studies of the correlation between weather and crops in a particular area, by examination of the data relating to crop yields and meteorological conditions in that area over a number of years, with the object of increasing the accuracy of crop estimates.
- (2) The organisation by the Ministry of Agriculture on a uniform plan of the collection of observations on the state of crops (autumn and spring sown cereals, root crops, potatoes, grass, and horticultural crops), and the incidence of insects and fungi, accompanied by meteorological observations at agricultural experiment stations in all parts of the country.
- (3) The carrying out of special intensive studies of the reaction of crops to weather.

The committee's recommendations were adopted by the Agricultural Research Council, and a conference of representatives of education and research, under the chairmanship of Sir A. D. Hall, drew up a scheme to carry out the committee's second recommendation.

The British Agricultural Meteorological Scheme.

The following are particulars of this scheme, in which the Ministry of Agriculture, the Board of Agriculture for Scotland, and the Meteorological Office are jointly concerned. Twenty-three agricultural meteorological stations have been set up at the following places:—Craibstone, Boghall (Scotland, E.); Cockle Park, Houghall, Osgodby (England, N.E.); Sprowston, Cambridge, Rothamsted, Chelmsford (England, E.); Sutton Bonington, Wellington, Worcester, Oxford (Midland Counties); Wisley, East Malling, Wye, Long Sutton (England, S.E.); Newton Rigg, Aber (England, N.W.); Aberystwyth, Long Ashton, Newton Abbot, Gulval (England, S.W.). These stations are shown in the map on page 327. The stations are situated at agricultural research institutes, agricultural colleges, crop testing stations, or county council farm institutes. The observations taken are of four kinds: (1) meteorological, (2) agricultural, (3) horticultural, (4) phenological.

Meteorological Observations.

All the stations take the meteorological observations; these are maximum and minimum air temperature, from which mean and "accumulated" temperature is computed; rainfall; sunshine; soil temperature (2 ft., 8 in., 4 in.); humidity (dew point and relative humidity); wind; and general weather observations. These observations are taken once daily, at 9 a.m. G.M.T., with the exception of humidity and soil temperature, the data regarding which are taken three times daily, at 9 a.m., 3 p.m., and 9 p.m.

In addition, certain stations (*e.g.*, Rothamsted and Cambridge), which have been equipped with self-recording instruments, take the meteorological observations in greater detail. These centres are engaged in researches directed towards improving the reliability and usefulness of the routine observations.

Agricultural Observations.

Most of the stations take observations on agricultural crops for correlation with the meteorological data. These observations are taken on selected fields in the neighbourhood of the meteorological station, and relate to the same varieties of crops each year. Those specified so far are as follows:—

Corn Crops (Wheat, Oats, Barley).—Variety, soil characteristics, previous cropping, manuring, cultural operations, date of sowing, date of appearance above ground, date of breaking into ear, date of flowering, date of harvest, the yield per acre of corn and straw and the bushel weight; attacks of diseases and pests. (A phenomenon between the date of appearance above ground and the date of breaking into ear is to be specified later. In the case of oats this intermediate stage is when the majority of plants in the field show four leaves.)

Root Crops (Turnips, Swedes).—Variety, soil characteristics, previous cropping, manuring, cultural operations, date of sowing, date of appearance above ground, date of breaking into rough leaf, yield per acre (tops and roots separately), attacks of diseases and pests.

Grass (Meadow Hay).—Soil, manuring, cultural operations, date of flowering of (a) sweet vernal, (b) perennial rye grass, date of cutting, yield per acre of hay; attacks of diseases and pests.

Crop Testing Stations.

In the case of agricultural crop observations, the agricultural meteorological scheme has been combined with a scheme for the testing of varieties of farm crops. Under the latter scheme, six stations have been established in different climatic districts of the country for the purpose of testing the yields of new varieties of cereals, roots, &c., in comparison with standard varieties for those districts; at such stations it is obviously necessary to take full and accurate measurements of the meteorological conditions under which the crops grow, in order, if the new varieties fail, to ascertain whether, and which, meteorological conditions are unfavourable to their growth, or, if they succeed, to be enabled to recommend them to growers under certain meteorological conditions.

Horticultural Observations.

Twelve stations take observations on horticultural crops for correlation with meteorological data. These stations are classed as either principal or secondary, according to whether special plots are set aside for the purpose of observations or

not. Special plots of peas are kept by both principal and secondary stations. Special plots of fruit are kept by principal stations; at secondary stations existing trees and bushes are used for the purpose of observations. The special plots consist of:—

- (1) *Apples* (Worcester and Bramley's Seedling).—Four bush trees of each variety. On Doucin (Type 2) stock with 2-feet legs.
- (2) *Plums* (Victoria).—Four half-standard trees.
- (3) *Blackcurrant* (Boskoop Giant).—Ten bushes interplanted.

True stocks of these varieties are supplied from the East Malling Research Station. The observations on these and on peas are as follows:—

Apple (Worcester and Bramley's Seedling) and *Plum* (Victoria).—Date of flowering, duration of blooming season, date of June drop, date on which the bulk of the fruit is ripe, crop from each tree, attacks of diseases and pests, duration of defoliation period, shoot growth.

Blackcurrant (Boskoop Giant).—Date of blossoming, date when all currants are fully ripe, crop from each bush and total weight of fully ripe currants, duration of defoliation period, number of "big buds" during first week in January, attacks of diseases and pests.

Peas (Gradus).—Date of appearance above ground, height of peas at intervals of seven days, date of first open flower, date when first picking would be possible, average height of plants at completion of growth, volume of dry peas harvested, attacks of diseases and pests.

Fruit Testing Stations.

In the case of horticultural crop observations, this scheme has been combined with a scheme for the testing of new varieties of fruit trees, under which stations are being established in different climatic districts of the country; this scheme is a counterpart of the crop testing scheme which has been explained above.

Phenological Observations.*

In addition to the observations on plant growth and plant pest appearance, required under the agricultural and horticultural parts of the scheme, various stations have responded to an invitation to collect additional phenological observations: these observations are the date of flowering (or other growth stage) of any or all of twenty-one wild plants, shrubs, and trees. The observations are made year after year on the same bush, plant, or association of plants, growing under average conditions (*i.e.*, not very sheltered or very exposed), well established. In selecting the plants to be observed, preference is given to species growing in the neighbourhood of stations where observations under the Agricultural Meteorological Scheme are being recorded, and which are familiar to farmers and, possibly, to other individuals.

It may be explained that the effect of all the meteorological elements making up the character of the season can be expected to be summed up in such plants as have been selected: these plants may be termed indicator plants, and they show whether the season is early, normal, or late. Observations of this kind have been summed up in the United States in a "bio-climatic law" of latitude, longitude, and altitude, to the effect that the climatic variation in plant development is some four days to each degree of latitude and to each five degrees of longitude, and to each 400 feet of altitude, the phenological dates being later northward, eastward, and upward in the spring and early summer, and the reverse in the late summer and autumn. Good use has been made of these phenological observations in regulating farming operations and in combating pests (*e.g.*, Hessian fly).

In addition to the data specified above, diaries are kept at the stations for the purpose of recording day by day the observer's own impressions of the effect of weather on crops. When the material (meteorological and biological), collected under the Agricultural Meteorological Scheme, is available in satisfactory form for a sufficient length of time, arrangements will be made for it to be subjected to rigorous statistical examination with the object of determining the effect of meteorological conditions on the growth of crops. It is hoped, also, to place freely at the disposal of investigators interested in one or more of the various aspects of the work, all the material available. During the time that the scheme has been in operation,

* Phenology is that branch of meteorology which treats of climatic influences on certain recurrent phenomena of animal and vegetable life.

monthly reports have been issued summarising the data collected at the various stations, and copies of these reports may be obtained free on request from the Ministry of Agriculture and Fisheries. It is further hoped that the observers at the different stations will keep in mind the objects for which the observations are made, and utilise them whenever opportunity occurs in their own districts. Exceptional occurrences, like long droughts, heavy floods, unusual lack of sunshine, &c., must express themselves on crops and stock, and may produce effects after long intervals that an ordinary monthly comparison will not disclose. There is also the question of the recovery of crops from adverse conditions, which cannot very well be scheduled, but may be of real importance and interest to those who are in daily touch with the facts.

The agricultural meteorological scheme of the Ministry is in the charge of a committee, of which representative meteorologists and agricultural, biological, and statistical workers are members.*

Effect of Weather on Animals.

The writer has failed to discover that much attention has yet been paid, in foreign agricultural meteorological schemes, to correlating the meteorological data available with data relating to animal husbandry. Climate has obviously been as important in determining the fauna of various districts as it has the flora. Obviously, crops have an important influence on the animals feeding on them, so that climate will affect animals indirectly through crops. It must also have a direct influence. Temperature and humidity, necessarily, have considerable effect on the *health* of animals and on the pests to which they are subject. Temperature must affect the *rationing* of animals for the production of meat and milk, and weather conceivably affects the composition of milk; the effect of sunlight, even, has to be considered in connection with the feeding of animals. And, as regards *breeding* questions, it seems that meteorological conditions influence fertility (at least of sheep); and artificial lighting (quite apart from effects on health and rationing) may also influence fecundity. The effect of meteorological conditions on the animal husbandry of the country appears therefore to offer a wide field for study.

NOTE.—No attempt has been made in this article to deal with the supply of weather forecasts to farmers; a special leaflet on this subject ("The Weather and the Farmer") may be obtained free on application to the Ministry of Agriculture and Fisheries.

The writer desires to express his indebtedness to members of the committee for their kindness in perusing and making suggestions regarding this article.

* The committee is composed of:—Sir Napier Shaw, F.R.S. (Chairman), Sir Thomas Middleton, K.B.E., C.B., &c., Prof. V. H. Blackman, F.R.S., Mr. R. Corless, M.A., Dr. R. A. Fisher, M.A., Mr. J. C. F. Fryer, M.A., Mr. R. H. Hooker, M.A., Mr. R. G. K. Lempfert, C.B.E., Mr. H. G. Richardson, M.A., B.Sc., Mr. H. V. Taylor, A.R.C.S., Mr. W. R. Black, B.Sc. (Secretary).

QUEENSLAND SHOW DATES, 1926.

Wynnum: 3rd and 4th September.
 Imbil: 8th and 9th September.
 Zillmere: 11th September.
 Gympie: 15th and 16th September.
 Beenleigh: 16th and 17th September.
 Stephens: 18th September.
 Pomona: 22nd and 23rd September.
 Malanda: 22nd and 23rd September.
 Esk (Camp Drafting): 24th and 25th September.

Melbourne Royal: 16th to 25th September.
 Rocklea: 25th September.
 Nundah: 1st and 2nd October.
 Kenilworth: 7th October.
 Southport: 9th October.
 Enoggera: 9th October.
 Balmoral: 16th October.
 Brookfield: 23rd October.
 Mount Gravatt: 30th October.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JULY, 1926 AND 1925, FOR COMPARISON.

Divisions and Stations.		AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.		AVERAGE RAINFALL.		TOTAL RAINFALL.	
		July.	No. of Years' Records.	July, 1926.	July, 1925.			July.	No. of Years' Records.	July, 1926.	July, 1925.
<i>North Coast.</i>						<i>South Coast—continued:</i>					
		In.		In.	In.			In.		In.	In.
Atherton ...	...	0·94	25	0	0·17	Nambour ...	...	2·97	30	1·34	0·23
Cairns ...	...	1·60	44	0·27	0·55	Nanango ...	...	1·76	44	1·02	0·57
Cardwell ...	...	1·45	52	0·49	0	Rockhampton ...	...	1·49	39	0·26	0·18
Cooktown ...	...	1·01	50	0·50	0·46	Woodford ...	...	2·53	39	0·43	0·25
Herberton ...	...	0·73	39	0·26	0·26	<i>Darling Downs.</i>					
Ingham ...	...	1·54	34	0·67	0·33						
Innisfail ...	...	4·71	45	2·69	0·98	Dalby ...	...	1·78	56	0·64	1·13
Mossman ...	...	1·52	13	0·10	0·35	Emu Vale ...	...	1·59	30	1·23	0·93
Townsville ...	..	0·57	55	0·19	0·11	Jimbour ...	...	1·65	38	0·38	1·30
<i>Central Coast.</i>						Miles ...	...	1·73	41	0·30	0·63
Ayr ...	...	0·67	39	0	0·15	Stanthorpe ...	...	2·08	53	1·65	1·92
Bowen ...	...	0·94	55	0	0·43	Toowoomba ...	...	2·10	54	0·89	0·84
Charters Towers ...	...	0·63	44	0·17	0·23	Warwick ...	...	1·85	61	0·92	1·09
Mackay ...	...	1·70	55	0·13	0·39	<i>Maranoa.</i>					
Proserpine ...	...	1·35	23	0·24	0·42						
St. Lawrence ...	...	1·31	55	0·06	0	Roma ...	...	1·51	52	0·18	0·56
<i>South Coast.</i>						<i>State Farms, &c.</i>					
Biggenden ...	..	1·46	27	0·55	0·87	Bungewongorai ...	...	1·73	12	0·12	0·55
Bundaberg ...	...	1·93	43	0·18	0·45	Gatton College ...	...	1·45	27	0·36	0·59
Brisbane ...	...	2·31	75	0·85	0·72	Gindie ...	...	1·04	27	0	0·52
Childers ...	...	1·80	31	0·92	0·43	Hermitage ...	...	1·81	20	0·98	0·86
Crohamhurst ...	...	2·94	20	1·00	0·50	Kairi ...	...	1·25	12	0·36	0·42
Esk ...	...	2·05	39	0·60	1·07	Sugar Experiment	...	1·50	29	0·07	0·42
Gayndah ...	...	1·52	55	0·34	0·41	Station, Mackay	...				
Gympie ...	...	2·23	56	1·05	0·58	Warren ...	...	1·27	12	0·13	0·18
Caboolture ...	...	2·31	39	0·57	0·43						
Kilkivan ...	...	1·71	47	0·20	0·81						
Maryborough ...	...	1·96	54	0·99	0·34						

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year and for the same period of 1925, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

RECENTLY DESCRIBED QUEENSLAND PLANTS.

In continuance of the series of illustrations of recently described Queensland plants, two species are represented on Plate 40. Botanical descriptions of these new species were published in the Proceedings of the Royal Society of Queensland for 1925 by Messrs. C. T. White (Government Botanist) and W. D. Francis (Assistant Government Botanist). The figures were drawn by Mr. I. W. Helmsing, Illustrator of the Department of Agriculture and Stock. The two plants shown belong to the Labiate family, which also includes such well-known plants as mint and sage.

In Figure 1, *Prostanthera megacalyx* is represented. It is a shrub or undershrub first collected at Quilpie, Western Queensland, by Mr. A. E. Deane, who writes: "This shrub grows on the side of a very rocky ridge and has been flowering since August, when I first noticed it." The other species, *Prostanthera suborbicularis*, shown in Figure 2, was found at Adavale, in Western Queensland, by Dr. W. MacGillivray, the well-known naturalist, on 29th August, 1923.



FIG 1a x 6.

FIG 1



FIG 2a x 12.

FIG 2.

PLATE 40.

Fig. 1, *Prostanthera megacalyx*, about natural size ; 1a, anther $\times 6$.

Fig. 2, *Prostanthera suborbicularis*, about natural size ; 2a, anther $\times 12$.



PLATE 41.—THE OFFICIAL OPENING BY HIS EXCELLENCY THE GOVERNOR-GENERAL, LORD STONELAVEN.

THE GOVERNOR-GENERAL, LORD STONELAVEN, is seen in the foreground, surrounded by a large crowd of people. The background shows a vast, open landscape with a large building visible in the distance.

ROYAL NATIONAL EXHIBITION.

THE GREAT AGRICULTURAL EVENT OF QUEENSLAND'S YEAR—HIGH STANDARDS MAINTAINED—THE MOST SUCCESSFUL SHOW OF A LONG SERIES.

The great Annual Show in the State Capital provides a fitting stage for the presentation in infinite variety of Queensland's products and the pick of her flocks and herds.

Standard Stock breeds; principles and practice of modern farming; improvements in agricultural machinery, implements, communication and transport; the richness of Queensland's rural resources; the inter-dependence of country and urban industry; and the intricacies of business procedure as applied to primary production were all demonstrated, typified, or represented.

The general happy social conditions of Queensland were reflected in huge daily attendances of prosperous-looking and orderly crowds.

In weather and everything else the National Association was well favoured and many new records were established.

In the brilliant sunshine of a typical Queensland spring day the 51st Annual Show of the Royal National Association of Queensland was opened by His Excellency Lord Stonehaven, Governor-General of Australia, on 9th August. The exhibition was a revelation of the immense natural wealth of Queensland and her wonderful capacity for production, even in a year of unusual dryness. On the opening day all previous attendance records were broken, when, it is estimated, 80,000 people congregated on the ground.

The Court of the Department of Agriculture and Stock, district exhibits, and the fine educational and originally arranged exhibits of the Forestry Service were outstanding features of the pavilion displays. The stock paraded in the arena and presented for judgment would command attention and win commendation in any show ring in the Commonwealth. Visitors from other States, including some of Australia's most successful breeders, were favourably impressed with the quality of the cattle shown. The horses, too, particularly the blood and draught classes, were worthy representatives of their respective breeds. A group of Clydesdale sires, which have been placed at the disposal of farmers for breed improvement by the Government, commanded attention and shared in popularity with the remarkably fine troop of police riders from the Government Remount Station.

Another notable feature was a great display of motor vehicles, which improve in range and variety each year, in the John Reid Hall and associated annexes.

A collection of temperate and tropical fruits in almost infinite variety and excellence of quality could not, probably, be excelled in any county.

Among those present at the official opening besides the Governor-General and Lady Stonehaven were His Excellency the Lieutenant-Governor, Hon. W. Lennon; the Premier, Hon. W. McCormack; the Minister for Agriculture and Stock, Hon. W. Forgan Smith; the Under Secretary, Mr. E. Graham; the Assistant Under Secretary, Mr. Robert Wilson; the Director of Agriculture, Mr. H. C. Quodling; the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby; the Director of Fruit Culture, Mr. A. H. Benson; the President of the R.N.A., Mr. E. Baynes; and the Secretary of the R.N.A., Mr. J. Bain.



PLATE 42.—GENERAL VIEW OF THE ARENA ON THE OPENING DAY. GRAND PARADE IN PROGRESS.



PLATE 43.—AN INFORMAL CHAT ON QUEENSLAND'S RESOURCES. THE GOVERNOR-GENERAL OF AUSTRALIA (LORD STONEHAVEN) AND THE PREMIER OF QUEENSLAND (HON. W. MCCORMACK).

THE AGRICULTURAL COURT.

REPRESENTATION AND REVIEW OF DEPARTMENTAL ACTIVITIES.

This year the Court embraced a number of new features. The several sections were prepared for educative purposes and to illustrate the work of technical and field officers of the Department.

Individual trophies presented a completeness both in artistic detail and in the manner in which information was presented for the benefit of the interested observer. The general arrangement of the Court within a neat colonnade treated in white and gold relieved with buffs and set off with festoons of greenery and ferns was combined in an harmonious setting.

The several sectional displays, of which detailed descriptions follow, comprised exhibits of Sugar, Wool, Maize, Wheat, Cotton, Power Alcohol, Broom Millet, Rice, Sorghums, Tobacco, Fruit and Horticulture, Herd Testing, Pig and Poultry Raising. A panel of edible shrubs, contributed by the Botanical Section, was of particular interest, while the Entomological and Plant Pathological Division of the Department and the Stock Experiment Station at Yeerongpilly also added highly educational evidence of the alliance of Agriculture with Science.

QUEENSLAND'S WEALTH IN WOOL.

Many excellent exhibits of Queensland's great staple industry were included in district exhibits. The Department of Agriculture and Stock had a magnificent display in its Court, in which a highly educative trophy based on fleeces and pieces, arranged by the Instructor in Sheep and Wool, Mr. W. G. Brown, was a conspicuous feature. Experts, both of the run and the wool room, were immensely pleased with its appearance and comprehensiveness. It was most elaborate, and wool information and samples were so tabulated and arranged as to convey to even the casual observer an idea as to the stages in sequence of converting wool from its greasy state to the finished fabric. A sample of a clip from each district was distinctly arranged and its commercial value indicated. Queensland being probably the finest Merino country in the world, samples of this wool predominated naturally. Coastal and crossbred wools were also displayed to advantage. All were bright, clean, fine up to super fine, and high-yielding—most attractive wools of the highest quality. "The best fleeces the Department has ever handled" was the verdict of Mr. Brown.

In the several district exhibits wool was a prominent feature. Woodford and Kilcoy showed specimens of Romney Marsh, crossbred, comeback, and Leicester-cross, all tastefully arranged. The Northern Downs were well represented with topping fleeces. South Burnett showed a good mixed range, not large, but of right quality. Wool in five varieties from the Brisbane Valley was up to a high standard.

The Wide Bay and Burnett display ranged from the fleece in the grease to finely-woven material, which enhanced greatly the whole presentation from this rich region. The South Coast had reason to be proud of its share in the wool display, while North Queensland was well represented in this section and earned very favourable comment. An outstanding exhibit was that from the North Coast and Tablelands (New South Wales), which comprised wools from Glen Innes and Inverell, embracing all specimens from Merino to coarse crossbreds. Scoured wool was also included.

The numerous entries and fine exhibits indicated strongly the increasing bias of farmers and small holders generally towards sheep-raising as an adjunct to their other undertakings. Wool in the Departmental Exhibit prepared by Mr. W. G. Brown comprised a good range of high-class Merino fleeces, similar in quality to those shown at Wembley and Dunedin Exhibitions. Quality ranged from 60's warp up to 80's spinners' wool. These were all typical Queensland wools, shown according to district of origin.

In a section was shown farmers' wool in the rough, as received at the Departmental Woolroom, to be treated under the Farmers' Wool Scheme. Several of the numerous sorts were shown. It was, of course, impossible to show every class or sort which is made in the course of the wool season. The British-Australian Wool Realisation Association found 847 types in Australian wool, and these are now stabilised for relative values and quality, a truly monumental work which is never likely to be altered.

The operations of the Departmental Wool Scheme are extending rapidly. It is of great advantage to the smaller holders to have their wool handled well, and put in an attractive form before the buyers.

Some graphic charts illustrating one of the activities of B.A.W.R.A. were shown. Two hundred and seven millions of pounds sterling were received for wool handled and sold by the Association in four years, with little actual loss or friction.

Graphic evidence of the activities of the Department in the Wool and Sheep Branch was presented. Lectures, practical advice, and inspection of land are all part of the week's work.

FODDER TREES AND EDIBLE SHRUBS.

Among the more remarkable and valuable features of the Australian vegetation is the number of trees and shrubs, natives of both the inland "scrubs" and open country, that are edible for stock. A representative collection of about thirty species was staged in the Departmental Court. Among them were specimens of Mulga, Kurrajong, Bottle-tree, Whitewood, Bumbil-tree, Cotton Bush, and several species of Saltbush. All these and many others have helped to keep stock not only alive, but in good condition during long spells of dry weather. The conservation, propagation, and utilisation of these valuable plants is obviously a matter of national importance.

The planting of combined shade trees and fodder trees is a move in the right direction towards successfully reducing pastoral risks in dry seasons. Many of the native trees, though excellent, are of slow growth; this cannot be said of all, however, particularly the Kurrajong and Red Ash. Some exotic trees also are useful fodders, and serve the combined purposes of shade and fodder. One of the most valuable of these is the *Phytolacca*, or Bella Sombra Tree, a tree of very rapid growth and standing heavy pruning. Another tree, the leaves of which are greedily eaten by stock, is the so-called "Portuguese Elm" (*Celtis sinensis*); this is an ornamental tree of fine spreading habit. This exhibit was altogether a fascinating feature of the Departmental Court.

Pastoralists and others interested in these matters are invited to send specimens for determination and report to the Department, or if contemplating planting to request information. Inquiries addressed to the Under Secretary or direct to the Government Botanist will always receive prompt attention.

SUGAR INDUSTRY—DISPLAY BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.

The varieties of cane exhibited by the Bureau of Sugar Experiment Stations included a number from Hawaii, West Indies, Java, and Mauritius. Other varieties were from Fiji and Queensland. The Queensland canes included a number of new varieties raised from seed at the Sugar Experiment Station at South Johnstone. Up to the present about 5,000 of these seedlings have been raised, but many of them are, of course, weeded out in the process of selection. Commercial trials of the best of them are now being undertaken. One of the objects of the Sugar Experiment Stations has been the introduction and testing of new varieties. Before any cane varieties are allowed to leave the Experiment Stations they have to pass chemical and commercial trials through plant, first ratoon, and second ratoon crops. Each variety is tested not less than four times in the course of the sugar season, so that records are obtained giving farmers and millowners information as to whether canes are early or late, and as to whether their sugar contents are sufficiently high to warrant their adoption. This is combined with agricultural trials in the field, so that it may be determined whether such varieties are good croppers. They are further keenly watched for evidence of disease, and no affected canes are allowed to go into distribution. When varieties have passed these trials they are carefully examined and packed before being sent to growers living at a distance from the Stations. All canes are distributed free to canegrowers. The worthless varieties are discarded. Information of this kind could only otherwise be secured by growers and millers at the cost of much time and money, and the rejection of many useless canes by the mills, which would be accompanied by severe loss to growers.

Full descriptions of the varieties exhibited appeared on cards, which also give commercial cane sugar content, attached to the canes. Many of these canes are at present undergoing chemical and field tests, while others have passed the probationary period, and are being distributed to growers. These varieties, however, comprise a very small proportion of the number of new and tested canes distributed from the Experiment Stations in the course of the past twenty years.

Sugar-Cane Propagation.

The Sugar Experiment Station at South Johnstone, near Innisfail, has, during the past three years, been engaged in the direction of raising cane from the seed found in the arrows. This requires the utmost care, as the seed is very minute and

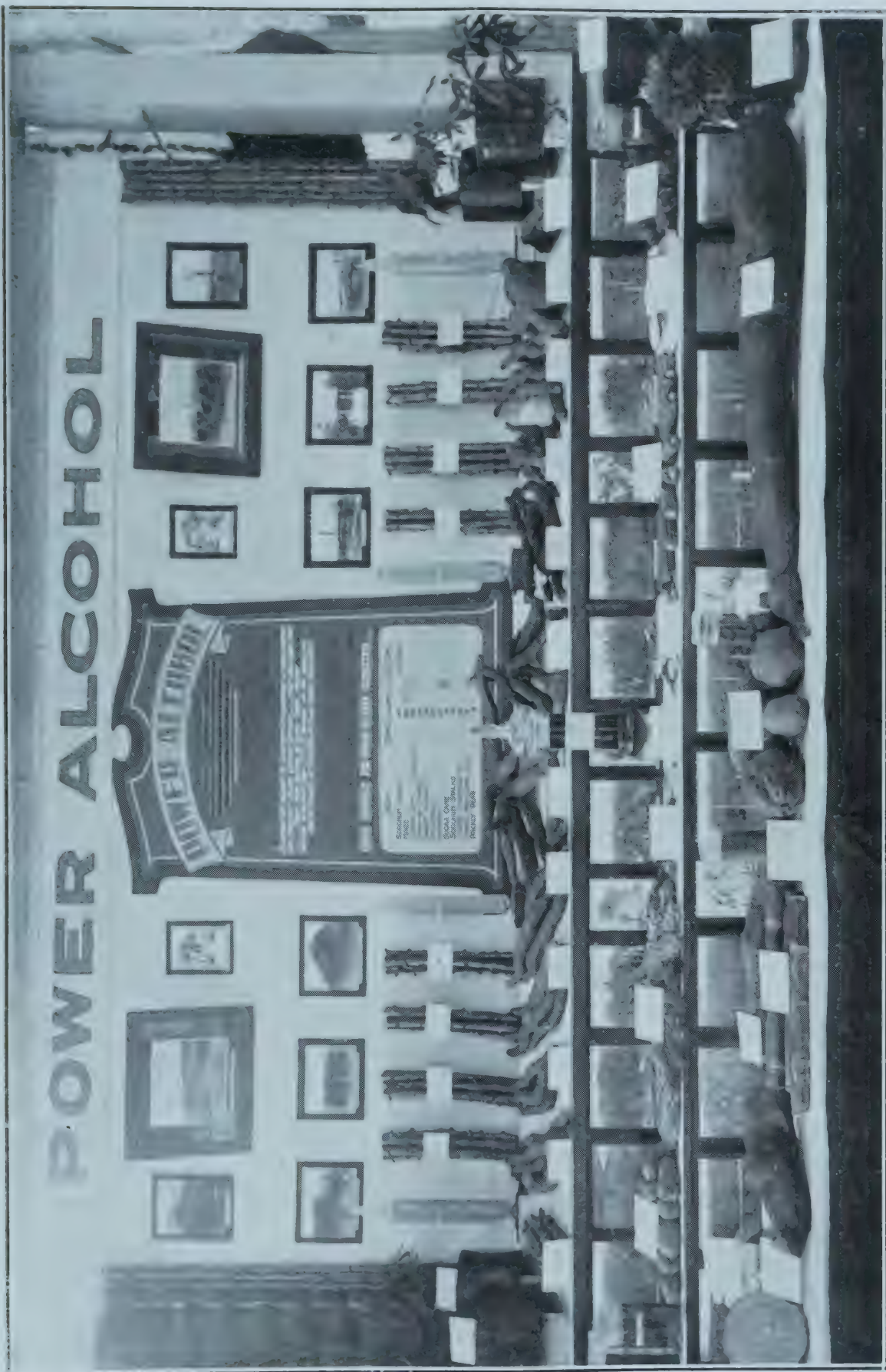


PLATE 45.—“OIL” FROM THE SOIL—THE FUEL OF THE FUTURE—QUEENSLAND MEETING A NEW DEMAND—THE MANY TROPICAL PRODUCTS FROM WHICH POWER ALCOHOL MAY BE OBTAINED—A SECTION OF THE DEPARTMENTAL COURT.

has to be handled most carefully. Specially prepared boxes of soil which have previously been sterilised are used. The cane arrows, when mature, are gently broken off, spread over the soil, watered, and then covered with glass plates. When germination takes place, a large number of minute shoots like grass appear. When these have made further growth they are carefully pricked out into pots or boxes, and are ultimately removed to the field. Several of them which were taken from Badila cane have Badila characteristics, and it is trusted that a cane equal to the Badila will be discovered.

Study of Soils, Cultivation, and Fertilising.

Work at the Experiment Stations also comprise the study of soils, cultivation, and fertilising. It is sought to introduce improved methods of cultivation, liming, fertilising, rotation of crops, and conservation of moisture, and growers are taught the principles of cultivation and business methods by visits to the Experiment Stations, and by lectures and addresses delivered in the several sugar districts, and by the issue of bulletins. It is claimed that this work has been highly successful. The Sugar Experiment Stations analyse soils free for canegrowers, and give advice by personal interviews or by letter on the requirements of the soil, particularly in respect to the application of lime where necessary, green manuring and fertilisers, and the treatment of the land by proper soil handling. Upwards of 1,400 cane soils have so far been analysed. Cane samples are also tested free of charge, so that growers may know the best time at which to cut their cane. Field officers move around among farmers, giving advice on cultural operations and other matters affecting their industry.

Investigation and Research Work.

Investigation and research work in connection with the sugar-cane's most serious pest—viz., the grub—is now being carried out by the Bureau of Sugar Experiment Stations in a systematic manner, and numerous bulletins have been issued upon the subject. The entomological laboratories are situated at Meringa, near Cairns, which is the centre of the worst grub-infested region in North Queensland. Chemical fumigants are being successfully used in the destruction of cane grubs. A pathological staff is being established to deal with diseases in cane.

Economic Value of Cane Cultivation—Its National Significance.

The work of the Sugar Experiment Stations, in relation to the promotion of the agricultural welfare of Queensland in connection with the sugar industry, cannot be over-estimated. When it is considered that this industry is the greatest agricultural one in Queensland, and will produce about 380,000 tons of sugar this year, estimated to be of the value of over £9,000,000, it can be seen how highly necessary it is that it should be assisted and encouraged in every possible way. Apart from its economic value, however, it has a deep national significance, and has already played a very large part in peopling the North.

The Sugar Belt.

Apropos of the sugar industry, it is to be noted, on reference to a map of the State, that the land in Queensland used for sugar-growing is included in a long, narrow, coastal belt. Parts of this belt are separated from each other by considerable tracts of non-sugar country. The latter, owing to a deficient rainfall or poorness of soil, are not suitable for cane. This belt is included between latitudes 16 deg. and 28 deg. south, and the bulk of the staple is grown within the tropics.

Rainfall.

The Queensland rainfall, fortunately, is highest during the summer period, at which time the cane plant makes its maximum of growth. The following are average rainfalls in the principal sugar-growing districts:—Cairns, 92.65; Johnstone River, 160.88; Herbert River, 84.91; Mackay, 66.67; Bundaberg, 44.40. Cane grows best when the relative humidity of the atmosphere is high, and this is the case during the wet season in Northern Queensland.

Queensland's sugar production in 1867 was 338 tons, and last year was about 484,000 tons.

The Greatest Agricultural Industry in the State—White Labour Production.

Australia is the only place in the world where cane sugar is produced by white labour. We are in competition with countries which produce sugar by black labour and under black-labour conditions. In Java, wages are only about 10d. per day, the worker keeping himself.

About £16,000,000 are invested in the Queensland sugar industry. It is the greatest agricultural industry in the State. No other branch of agriculture in Australia employs so much manual labour.

The yield of cane and sugar per acre is improving; this is due to better methods of cultivation and growth of superior canes. The mills have also largely increased their efficiency, and over £1,000,000 have been spent during the past five years in improving existing mills.

In addition, the Queensland Government has erected the most modern sugar plant in Australia in the Tully River district.

In the Court of the Department of Agriculture the activities of the Bureau were fittingly and impressively illustrated. It was a display in which the steady progress of a great industry was readily discernible, and that suggested illuminatingly what Science and Agriculture can do when working in double harness.

THE FUEL OF THE FUTURE.

No more important question affecting the commercial and industrial development of Australia exists to-day than that of the supply, within its own territory, of a relatively cheap and effective fuel for internal combustion engines. Apart from the diligent search for petroliferous oil in Queensland, the establishment in the Northern part of the State of distilleries for the manufacture of power alcohol at an early date promises to be one of the most important developments in the history of this progressive State. An unlimited field for its manufacture is at hand.

Fully 80,000 gallons of petrol are required to-day to meet requirements within the Commonwealth. As the world's supply of this latter product is decreasing, other sources of fuel supply are being exploited. Undoubtedly, Queensland offers a most suitable field for development of the production of power alcohol. Fifteen million gallons of molasses are produced annually as a by-product from sugar manufacture, estimated to furnish from sixty-five to seventy-two gallons of power alcohol to the ton.

Several crops which thrive well here can also be used for the same purpose. These include grain sorghum, maize, sweet potatoes, cassava tubers, arrowroot, and sugar-cane.

In the Power Alcohol Exhibit in the Departmental Court a special feature was made of cassava, as the Department of Agriculture and Stock, after importing 1,500,000 cassava cuttings from Java last year, has given attention to the distribution and planting of these in the Mackay district, in order to give the crop a thorough trial. Photographs of several experiment plots and of individual varieties, together with a number of relevant details, assisted in giving a completeness to this interesting and instructive exhibit.

AGRICULTURE.

Maize as King—The Central Trophy.

Maize was king this year and was enthroned in the centre of the Departmental Court. The trophy was a work of art and a distinctive feature of the whole display. In its general arrangement and the final court array, the work of Mr. H. W. Mobsby, F.R.A.S., Departmental Artist and Photographer, was plainly discernible. Though on a very much smaller scale, it was suggestive of his excellent work at Wembley, and more recently at Dunedin, where he arranged Queensland's representation of her contribution to Industry and Commerce with such effect that it was regarded as one of the strongest features of the Exhibition. The trophy illustrated the work of the Maize Specialist of the Department (Mr. C. J. McKeon) clearly and illuminatively. Methods of plant and seed selections were demonstrated, and relevant information was set out clearly on printed cards in proximity to each individual exhibit. The whole was an object lesson of what may be accomplished by head and hands working in unison.

The uniformity of type according to variety and the quality and productivity of the special strains of seed displayed afforded striking proof of the fact that nothing but good can result from scientifically-controlled seed improvement work of this character. The Department makes a practice each year of raising fairly large quantities of stud seed maize for distribution and sale to growers. Obviously, the grower has a direct means of improvement at hand, and if full advantage is taken of the Department's work, it must exercise a potent influence on the production of increased quantities of Queensland's principal cereal.



PLATE 46.—MAIZE TROPHY—CENTRAL FEATURE IN THE COURT OF THE DEPARTMENT OF AGRICULTURE.



PLATE 47. THE WINNING DISPLAY IN "A" GRADE. EXHIBIT FROM THE NORTH COAST AND TABLELANDS OF NEW SOUTH WALES.



PLATE 48.—THE WINNING DISTRICT EXHIBIT, "B" GRADE, FROM THE BRISBANE VALLEY.

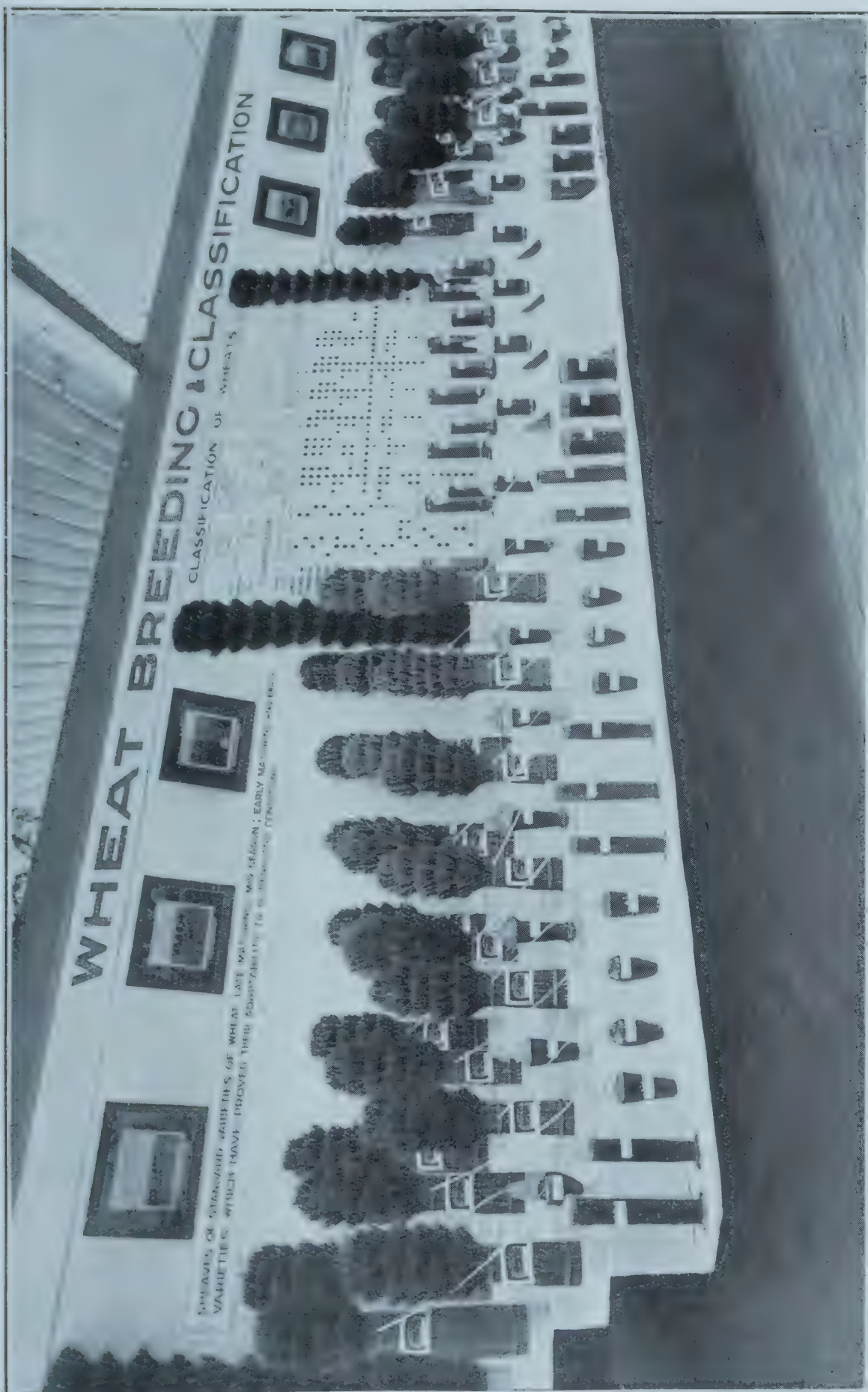


PLATE 49.—QUADRUPLING QUEENSLAND'S GRAIN YIELD. SYSTEMATIC PROGRESS IN WHEAT BREEDING, THE WORK OF THE
DEPARTMENT OF AGRICULTURE, ILLUSTRATED.

“Of the world's great work he has done his share
Who has garnered a crop of wheat.”

Wheat.

Special significance was given to this year's display, and it illustrated graphically the scheme the Department initiated for the standardisation of Queensland-grown wheats, which, at the commencement of the season, was agreed upon in conference between representatives of the Department and the Wheat Board, and immediately afterwards put into practice. Centrally situated in the exhibit were depicted the classification of varieties, their periods of maturity, the soils and districts most suitable for their development, and the character of each kind of grain.

Details of the scheme and of arrangements for giving effect to it were set out explanatorily. This served to stress the fact that the co-ordination of effort between officers of the Department and the representatives of the growers is a definite step towards placing wheatgrowing on a bedrock foundation.

The raising of supplies each year of pure seed of dependable varieties supplied in the first place by the Department of Agriculture, and their propagation under a premium system by arrangement with individual growers and the board, and the cleaning, grading, and substitution of the resultant seed for a large percentage of the commonly grown class of seed wheat, often of mixed origin and full of impurities, must exercise in the main a most beneficial effect on the stabilisation of the industry. Further, the scheme is designed to directly link up the work of field officers of the Department and its wheat breeder at Roma with that of the wheatgrowers and the board, and if given full effect to will indubitably have a direct influence on the expansion of a primary industry which promises to be a very valuable asset to the State. Already about forty growers are engaged in raising special strains of seed which should produce several thousand bushels this year, all things being favourable.

It was of interest to note in reference to the artistically prepared sheaves on the exhibit, the product of Departmental experiment plots, that they were similar in design to those sent to the Wembley and Dunedin Exhibitions, which, in the case of the former, were adopted as a standard type for the Commonwealth display at the Empire Exhibition.

It has often been remarked that Queensland cannot grow wheat. No more striking example in refutation of such statements could be seen than the excellent samples of straw and grain on the Wheat Trophy. It suggested the natural engendering of a feeling of confidence in an unbiassed observer that wheat must become an important Queensland crop. The major portion of the wheat exhibits owed their origin to the Roma wheatbreeding farm, and to the subsequent work of field officers in testing and proving adaptability of the varieties to differences in environment and soil common to an extensive range of wheatgrowing country.

Rice.

Sheaves of several varieties of Upland rice, samples of padi (unhusked rice), and Hulled rice, the commercial product, which was prepared in Brisbane from padi grown on Departmental experiment plots in the Northern part of the State, show unmistakably that the Upland variety thrives well under conditions where dependence is placed on the natural rainfall. Rice is generally regarded as a crop which has to be grown solely under irrigation conditions by cheap labour. This is not so. The Upland variety has been brought to a high state of perfection; it is a prolific cropper, and produces a heavy, plump, nutritious berry, equal to the best swamp rice. Of much significance also is the fact that Upland rice can be sown with a drill in a similar manner to wheat, harvested with a reaper and binder, and threshed with the same kind of machine as is used for threshing wheat.

Australia imports practically the whole of its rice requirements and its rice starch; ample scope exists, therefore, for the production of this valuable crop within her own borders. Tariff protection against the competition of cheap, foreign labour would be required. Excellent returns were obtained on the small experiment plots where the samples shown in the exhibit were grown; these ranged from a calculated yield of from forty-eight to fifty-five bushels per acre of rice padi.

Sorghum.

Dairymen who raise the ordinary classes of saccharine sorghum for fodder purposes are interested in a new strain of seed introduced in 1924 by the Department from the United States of America, where it is known as "Honey Sorgho." Tested on Departmental experiment plots in the North, where it thrives well, splendid yields were obtained, ranging from 25 to 34½ tons of green fodder per acre. Owing to its high sugar content, animals are very fond of "Honey Sorgho," which promises to be an acquisition to stockowners. Specimens in the Departmental Court attracted much attention.

Tobacco.

In this section two interesting models were shown of a flue-curing pipe leaf tobacco house and a barn for curing cigar leaf, also samples of the respective classes of tobacco. Modern manufacturers now demand that leaf must be carefully cured to conform to certain standards of quality to meet the requirements of customers who have been educated up to the use of higher grades of smoking tobacco, and the educational work of the Department in this respect was well represented.

Cotton.

The exhibit of the Cotton Branch this year was prepared to feature some of the factors which contribute to the production and the preparation of a bale of cotton. A bale of cotton was the central object in the display, and around this was grouped the exhibits and descriptions thereof, which illustrated many of the operations essential to the production of a bale of lint cotton.

On one side of the stand supporting the bale were displays explanatory of some of the important points of the plant-breeding operations which apply to the problem of breeding uniform strains of cotton to suit the different districts in the State in which the fibre is cultivated. Illustrations of the meaning of such terms as the "drag" of a cotton, the "uniformity of length of staple," the "lint index," "uniform seed types," "typical bolls," were of highly educative interest.

On the other side of the stand grades and staple lengths which are used in the classing or grading of the Queensland cotton crop were set out. The set of standards used in determining the grade of the seed cotton as it arrives at the ginneries and the set of standards of lint cotton which illustrate what the corresponding grades of seed cotton will produce when ginned were shown. In addition to these were panels of combed seed cotton and pulls of lint cotton illustrating the various staple lengths which are used in determining the average length of the fibres in each consignment of cotton received at the ginneries.

On the ends of the stand the by-products of seed cotton, such as the seed and its various products, were shown. These included displays of linters which are obtained from the seed prior to crushing for oil extraction; the kernels as they appear before being cooked; the slabs of 'cake' after the kernels are cooked and pressed to extract the oil; the meal obtained by grinding the cake; and the refined oil which is obtained from the cotton seed. Besides these, a display of cubes of pressed meal and molasses for stock feed was arranged. Both these and the ground meal are being used extensively on the sheep stations at the present time. In addition were shown panels of combed seed cotton illustrating the improvement which is being made in the Durango cotton through the plant-breeding operations of the Cotton Section of the Department of Agriculture and Stock. A comparison of the Durango variety in its different stages of improvement with the old Queensland cotton was presented. This afforded an opportunity of observing progress in improving the uniformity of Queensland cotton.

It is anticipated that with the organisation which has been developed in the Cotton Section of the Department of Agriculture even more marked progress will be made as the full effects of the various breeding operations are obtained. It is believed that under such a system as has been developed the cotton-growers of Queensland will eventually be receiving strains of seed which for uniformity will compare favourably with any other cotton-growing countries.

THE FRUIT INDUSTRY.

A variety of young stock from the Bribie State Nursery showing results of propagation by various methods, also specimen plants of new varieties of strawberries raised from seeds and giving every indication of all-round improvement on previously existing varieties, found place in the Departmental display.

Fruit of several varieties of Avocado pears (from Acclimatisation Gardens) showing the different types of this esteemed fruit were presented.

Specimens of citrus fruits were shown as an aid to definite and correct naming of varieties.

The pruning of deciduous and other fruit trees was interestingly illustrated.

DAIRYING.

The dairying industry is expanding throughout the State, and the dairy farmer is the pioneer in many of the new areas being opened for close settlement. The first half of this season was favoured with serviceable rains, and the output of dairy products was heavy. Dry conditions of the latter half of the season curtailed operations considerably. Enlargement of dairy factory premises and the remodelling of manufacturing plants has received attention, and most large factories are furnished



PLATE 50.

1. A PEEP AT THE ROSE SECTION, HORTICULTURAL DISPLAY.
2. SWEET PEAS IN THE HORTICULTURAL BOWER.



PLATE 51.—INTERESTED VISITORS.

(Right to Left).—Hon. W. Forgan Smith, Minister for Agriculture and Stock, and Mrs. Smith; Mr. E. Graham, Under Secretary, Department of Agriculture and Stock, and Mrs. Graham.

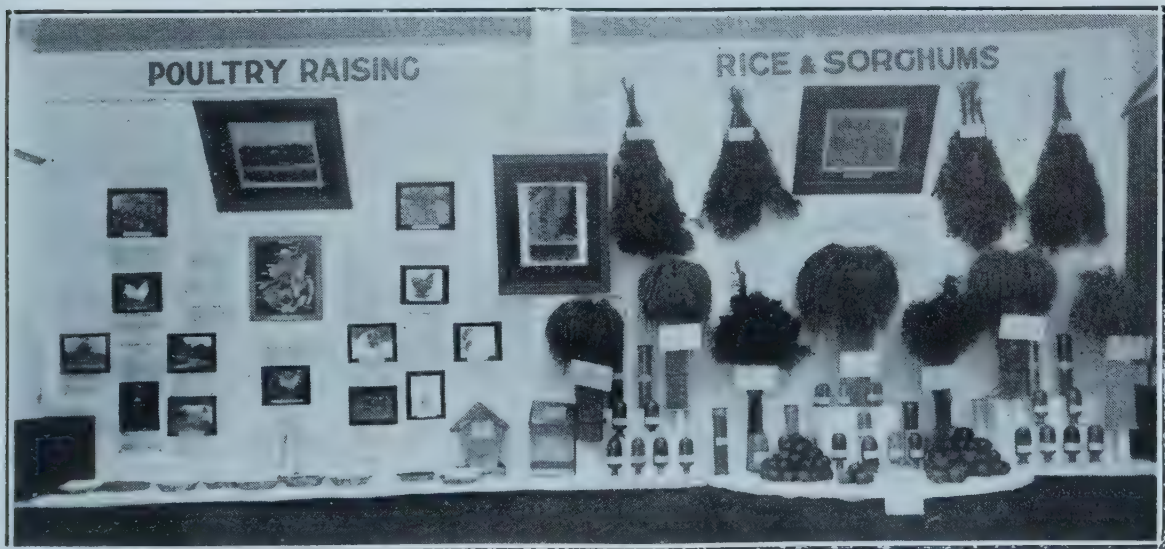


PLATE 52.—DEPARTMENTAL ACTIVITIES ILLUSTRATED.

Court of the Department of Agriculture.



PLATE 53.—POPULAR PANELS IN THE COURT OF THE DEPARTMENT OF AGRICULTURE.



PLATE 54.—A "WHITE HOPE" OF WHITE AUSTRALIA.
A Representation of Queensland's Progress in Cotton Culture, Court of the
Department of Agriculture.



PLATE 55.—A STUDY IN "COUNTS"—WOOL TROPHY IN THE COURT OF THE DEPARTMENT OF AGRICULTURE.

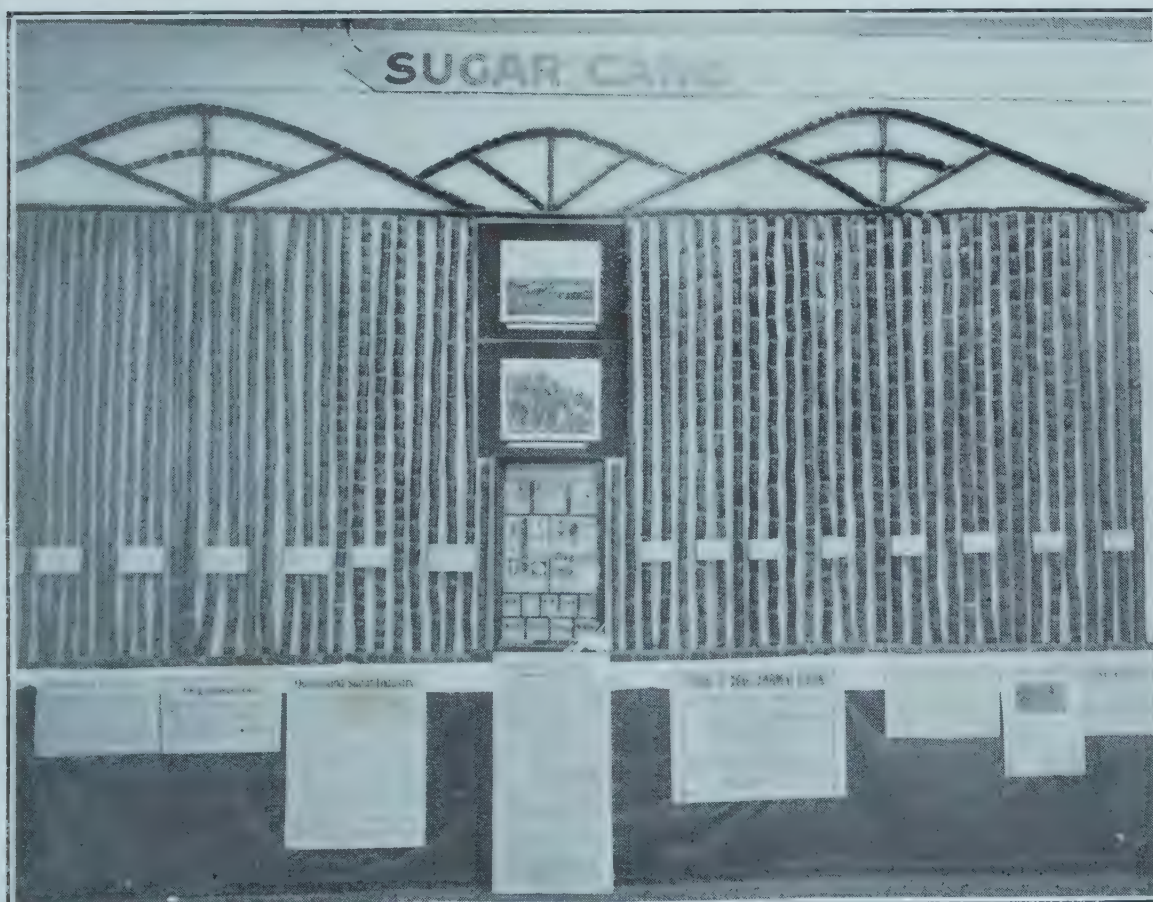


PLATE 56.—THE GREAT WORK OF THE BUREAU OF SUGAR EXPERIMENT STATIONS ILLUSTRATED IN THE DEPARTMENTAL COURT.

with the most modern dairy plants. Pasteurisation of cream for butter-making is carried out throughout the State. The process aids in the production of a more uniform butter of excellent storing character. The work of the various bodies operating under the provisions of the Primary Products Pools Act has benefited the industry. The adoption of the "Kangaroo" brand for choicest butters exported from the Commonwealth has had the effect of improving the value of Australian choicest butters on the London market. The success of Queensland exhibits in the International Butter Test held in New Zealand has assisted materially to draw the attention of overseas buyers to the excellent quality of our first-grade butters. Quality combined with systematic marketing provides against undue fluctuation of prices, and gives to the primary producer an increased return for his products. Pasteurisation of milk for cheesemaking has given satisfactory results, and the principle is being gradually adopted. The Hamilton Cold Stores opened for the season and have been accorded appreciative patronage. The refrigerated space provided is ample to meet an extension of the industry and the increasing patronage of dairy interests. Storage and loading facilities obviate fluctuations of temperature—an important factor in safeguarding the quality of dairy products. The butter passes direct from the cool rooms into the refrigerated chambers on the ships.

The better bull scheme was introduced by the Minister for Agriculture and Stock, Hon. W. Forgan Smith, with a view of encouraging the breeding of better dairy cows. Provision is made for a subsidy of £ for £ to purchasers of approved dairy sires. By systematic herd-testing and the use of pure-bred sires the production of the dairy herds will be increased and the industry made more remunerative. The conservation of fodder has been advocated by departmental officers, and advice is given regarding the suitability of crops and their preservation in the form of ensilage. The feeding of a balanced ration to dairy cows on a production basis has been stressed, and the economic importance of systematic feeding should receive careful consideration by all dairy herdsmen.

Departmental inspectors report that dairy farm equipment is being gradually improved; milking plants are being installed on many dairy farms. The proper erection, care in working, and cleansing are essentials in obtaining satisfactory results from the use of milking plants. There is evidence of a desire for a better class of dairy sires. The dairy instructors on the Departmental staff find that modernisation of dairy factory plants has had a beneficial effect on the product, and anticipate an increased quantity of first-grade dairy produce in the approaching season. The Departmental graders' work was very heavy in the earlier portion of this season. The gradual flow of dairy products to the Hamilton Cold Stores will tend to increase the efficiency of the work of the grading officers. All this work, in the form of representation, demonstration, and suggestion, was a strong exhibition feature.

The Herd Testing Branch of the Department was represented by a demonstration of the importance of the scales and Babcock tester. Herd-testing has expanded considerably during the last few years, and six officers were employed solely on this work last season. Applications were received from about 110 Local Producers' Associations for the services of herd testers, representing 525 dairymen. Approximately 15,000 cows were submitted for testing. It should be noted that the Department is carrying out this work free of cost. Herd testing has been in progress in other parts of the world for at least thirty years, and dairy farmers of Queensland should realise the importance of this work. The dairy section of the Departmental Court contained convincing evidence of the value of this work.

POULTRY.

Although small, this exhibit conveyed much useful information to both poultry keepers and prospective poultry keepers. The illustrations on the feeding of poultry for production were practical and valuable. The work of the Department and its general educational efforts were strikingly set out.

The combination of fruitgrowing and poultry-raising was well illustrated. Many handy home-made utensils, such as trap nests, feed hoppers, and a drinking fountain suitable for the use of chickens, completed an exhibit from which a good deal of information could be gathered and which was strong in every point.

ANIMAL PATHOLOGY AND BACTERIOLOGY.

Tuberculosis.—The various manifestations of tuberculosis in animals, especially among the bovine species, were displayed. In this connection a photograph of an apparently healthy cow, in reality a tubercular animal capable of transmitting tuberculosis, was shown. It was also clearly shown that tuberculosis is not an hereditary disease, and, provided certain precautions are taken, it is possible to rear healthy offspring even if both the male and the female parents are affected with the disease.

Tables setting out the number of pigs slaughtered in the course of a period of ten years and the percentage found to be affected with tuberculosis were exhibited, the inference being that, provided all milk products fed to pigs were previously heated to 180 degrees F., the percentage of affected pigs would show a substantial decrease.

Ticks.—Cattle ticks in various stages of development and informative cards and charts dealing with tick eradication work were featured.

Pure cultures of pathogenic micro-organisms growing on artificial media were displayed, and include a tubercle bacilli, blackleg bacilli, streptococcus mammitis, and bacillus abortus. The abovementioned organisms are responsible, as is well known, for some of the more common diseases in our cattle.

Plate cultivation showing the necessity for cleanliness on the dairy farm and in the factory was shown, and it was made apparent how and why cleanliness affects the quality and the keeping properties of dairy products. The solution of this problem is simple; the cans, after washing and cleansing, should be sterilised by live steam for a period of not less than three minutes. The usual practice of momentarily steaming or scalding the cans is quite ineffective.

Numerous cultures of contaminating bacteria which may, as a result of carelessness, gain access to milk and cream and impart unpleasant flavours and odours were exhibited.

Serums and vaccines prepared in the Laboratory for the prevention of blackleg, pleuro-pneumonia, tick fever, and for the prevention and cure of contagious mammitis and other diseases were tabled.

There were also cultivations of strains of lactic acid bacteria for the ripening of cream and for cheesemaking. This section was one of the strongest educative features of the show.

ENTOMOLOGICAL AND PATHOLOGICAL EXHIBIT.

The entomological section of the Division of Entomology and Plant Pathology was represented by a large series of exhibition cases illustrating the life histories of the more important insect pests of Queensland; the value of the exhibit was further enhanced by the display of fresh plant material featuring the work of several of the more destructive pests of bananas.

Much interest in the case illustrating the life history of the Queensland Fruit-fly, the several stages of which were illustrated adequately by a series of paintings and specimens of each stage of the insect's life cycle, was evident. Another case of outstanding interest was one illustrating in a similar manner the commoner scale insects of citrus orchards, while the codling moth case also received special attention.

Among the other entomological exhibition cases were those dealing with the pumpkin beetle, potato tuber moth, the large wax moth, the army worm, and the bean fly. Insects injurious to stock or associated with sickness in stock were represented by the blowflies and the ironbark saw fly.

The insect pests of bananas were illustrated partly by exhibition cases and partly by fresh and preserved plant material showing the nature of the injuries inflicted by the various insects. One large case illustrated the life history of the banana weevil borer, and a second one dealt with the banana fruit-spotting bug, while three smaller cases showed a fine series of insects associated with the banana plant. Fresh plant specimens also illustrated very adequately the damage done by the banana weevil borer and other banana pests.

The pathological section of the division was represented by a series of framed photographs and paintings showing the characteristic features of some of the more important plant diseases of this State; special mention may be made of those depicting bean anthracnose, Irish blight of tomato, brown rot of peach, black spot of citrus, pineapple fruit rot, and blackleg of potato. Irish blight was also fittingly figured. A banana plant affected with bunchy top was staged. This was a popular feature in view of wide-spread interest and of the comprehensive steps being taken to deal with it.

The large exhibition cases containing insect specimens and coloured drawings were the work of Messrs. E. Jarvis, H. Jarvis, and I. W. Helmsing; three small cases showing the various insects associated with the banana plant were the work of Mr. J. A. Weddell. The preparation of the exhibit was in the hands of the Chief Entomologist, Mr. Veitch, with whom were associated Messrs. J. L. Froggatt, J. H. Simmonds, I. W. Helmsing, and J. A. Weddell.



PLATE 57.—AN INTERESTING CORNER OF THE COURT OF THE DEPARTMENT OF AGRICULTURE.

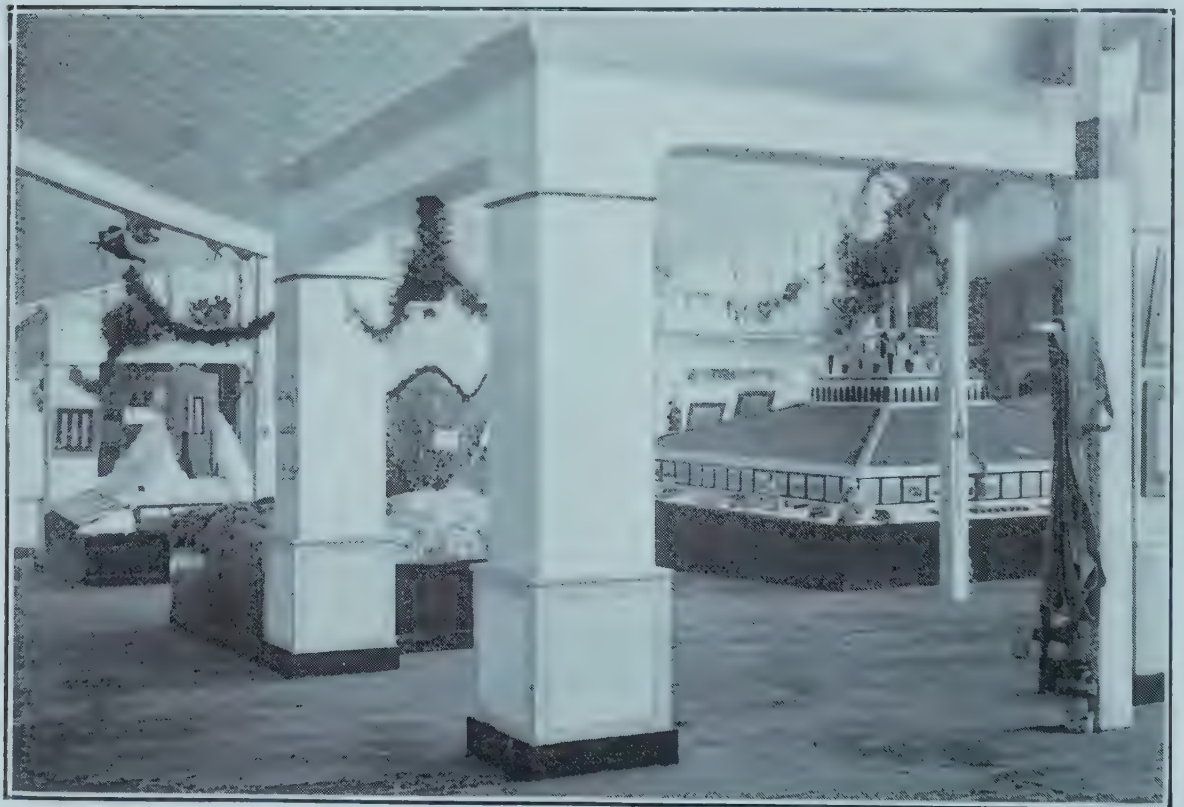


PLATE 58.—A GLIMPSE OF THE COURT OF THE DEPARTMENT OF AGRICULTURE FROM THE MAIN AVENUE.



PLATE 59.—QUEENSLAND FARMERS PROVIDE RAW MATERIAL FOR HOME INDUSTRIES—A PANEL IN THE DEPARTMENTAL COURT.

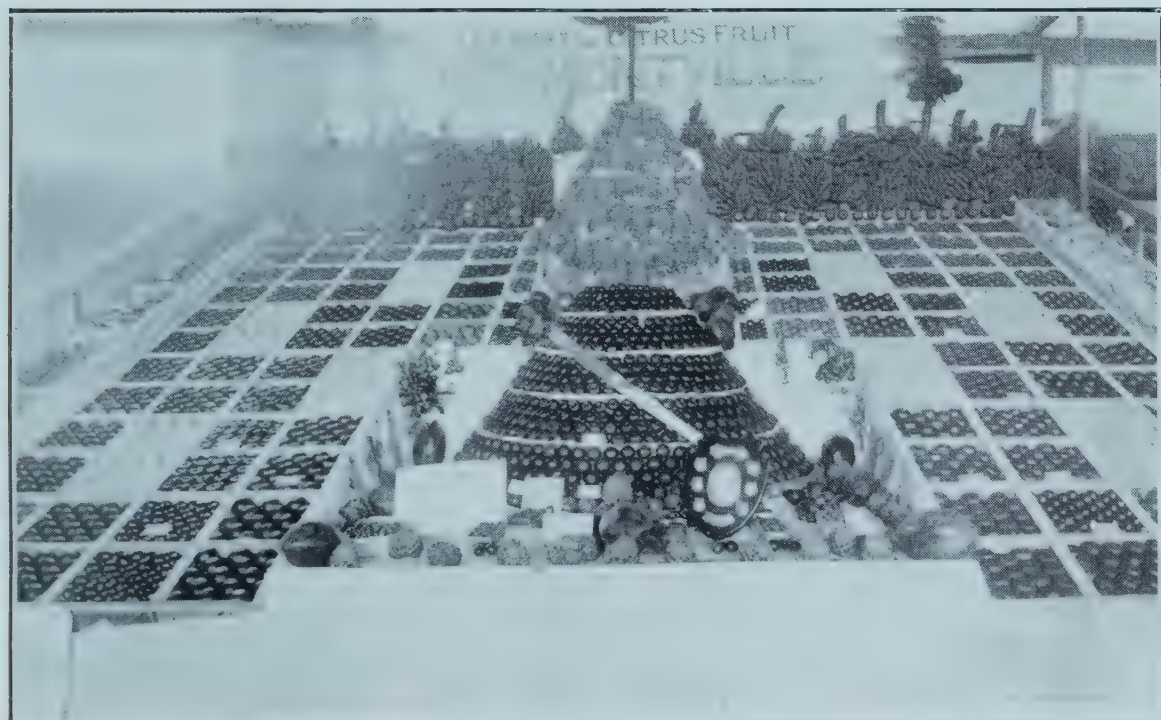


PLATE 60.—THE SUN GOLD OF SUNLAND. CITRUS FRUITS FROM THE FAMOUS BLACKALL RANGE.

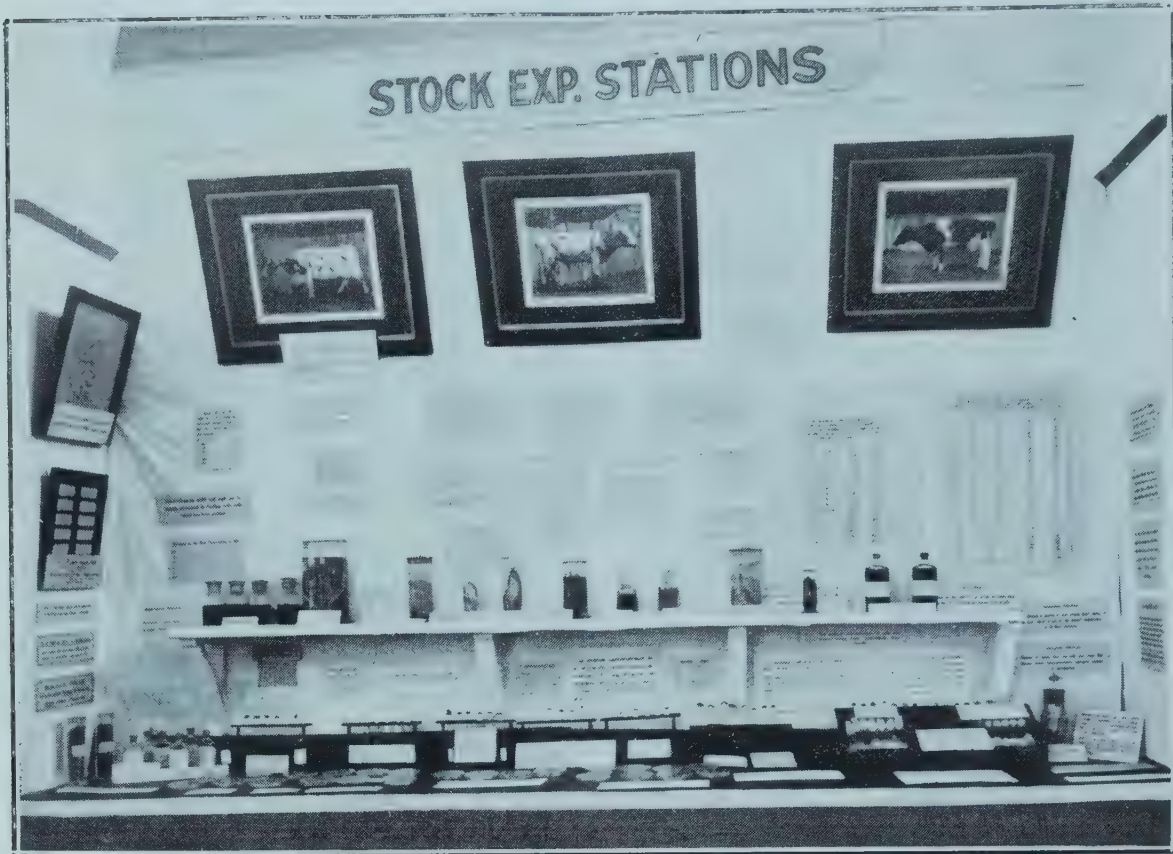


PLATE 61.—THE BACTERIOLOGIST'S CORNER.
A Great National Service Illustrated in the Departmental Court.



PLATE 62.—A DISPLAY OF NORTH QUEENSLAND PRODUCTS. A FIRST ENTRY OF
EXHIBITS FROM OUR FERTILE TROPIC LANDS.

STUD PIGS AT THE ROYAL NATIONAL SHOW.

E. J. SHELTON, Instructor in Pig Raising.

“Pigs is Pigs” might well have been written over the pig pavilion at the Royal National show recently concluded, for this year well over 300 head of pure-bred pigs, and a score or more pens of porkers and baconers were on view; they comprised the finest entry of stud pigs—in the stud sections—penned at any show in Queensland to date, and in so far as quality goes were far and away ahead of any previous exhibition. The exhibitors too were more numerous, and were drawn from a much wider field of activity, while their entries were in almost every instance more liberal and of very even quality. This speaks volumes for the progress of the industry, for exhibiting pigs at shows is by no means an easy task even with the comparatively good conditions under which the pigs are accommodated on the Royal National Showground, conditions by the way which will have to be considerably improved upon if the entry grows, as there is every evidence that it will as the years go by.

It is evidence, too, of the improved value being placed on the better class animal, for though the stud sales were in a general sense dull and unattractive, the average price realised is far higher than could have been obtained even five years ago. Twenty guineas was an almost unheard of price for a stud pig in the days that have past, but even with a dull market at this year's show this figure was exceeded in several instances, and this for comparatively young animals. The increased entry in the Pig Section, and the greater distance travelled by exhibitors in coming forward to the show, is evidence also that Queensland is being recognised more and more as an agricultural and pastoral State, a country in which pig raising is destined to play an important part as an agricultural vocation. It is evidence that stud breeders are looking to the North for a market outlet for the stud animals they have available for sale, and which, if prospects are sufficiently attractive, they are prepared to exhibit in the competitive class, and then with or without prize records submit to public auction or private contract for disposal to the best advantage possible to breeders anxious to improve and build up their herds here. The stud sales are important events too, for farmers from every portion of the State, and many visitors from other States, gather together, and opportunity offers for the purchase of selected animals—a range of animals which it would be very difficult to inspect at any other season of the year. The stud sales play an important part in that breeders look forward to them as providing this special opportunity for purchase, one farmer in particular remarking that he not only usually buys a pig or two himself but his neighbours commission him to secure “something special” for them, for with the hall mark of having been exhibited at Brisbane Show a greater value is placed upon the animals than if they were purchased locally even at a lower price.

The Pig Section is a growing one too; it is one that is causing the Royal National officials a good deal of concern, for, as one of the committee remarked, “Its no good, we will just simply have to find the money to build your fellows a better and a more commodious pig pavilion, and when that is done we hope it will be placed in the vicinity of the cattle section and not as at present in what has been known as ‘Petty's Paddock,’” quite a long way from where the cattlemen—who are the ones usually specially interested in the pigs—gather.”

It is a particularly important section from a departmental point of view, for with thousands of interested folks viewing the exhibits all day long every day of the show the slogan of “Better Pigs on Every Farm” must be impressed on a much wider field of both city and country folks than if there were no show at all.

One feels convinced that the thousands of people, both young and old, who “see” good pigs at the show and who view them in clean, comfortable, well-bedded, and nicely white-washed pens, must go away with a more up-to-date idea of the possibilities of keeping pigs clean and of the advantages to be gained by providing a superior class of accommodation for their animals; at any rate, the idea that the pig is a filthy, degraded animal, and that pig raising is a “low down” occupation, must surely be dispelled as one passes up and down the clean orderly pig pens on the showground. This is the more important when considered from the standpoint of



PLATE 63.—CHAMPION POLAND-CHINA SOW "DANESBRO WINIFRED," BRISBANE SHOW, 1926. Owner, Mr. A. N. White.



PLATE 64.—RESERVE CHAMPION POLAND-CHINA BOAR, "ORORA ADONIS," BRISBANE SHOW, 1926. Exhibited by Mr. A. T. Beezley.



PLATE 65.—RESERVE CHAMPION BERKSHIRE SOW, BRISBANE SHOW, 1926.
Bred and exhibited by Dunwich Benevolent Asylum, Stradbroke Island, Queensland.

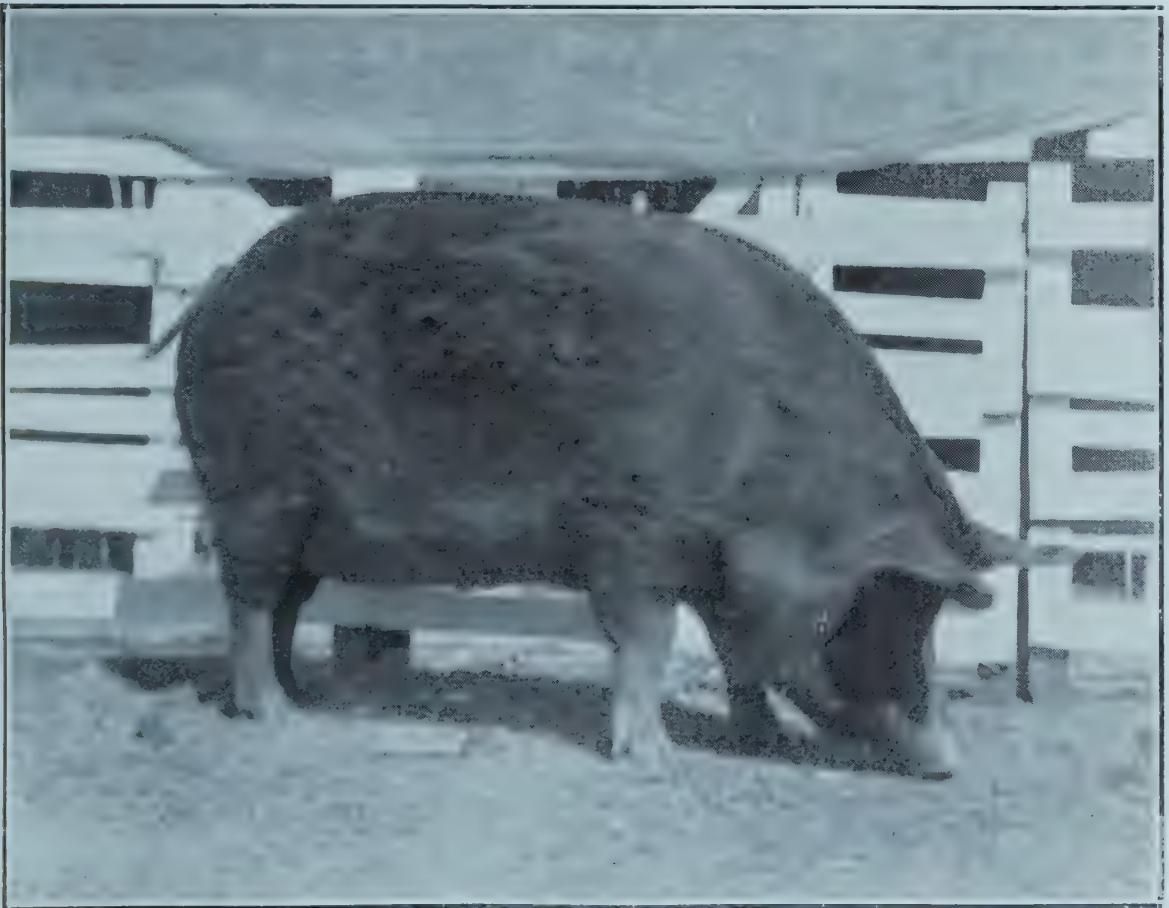


PLATE 66.—CHAMPION TAMWORTH SOW, "BLAKENEY RIBBONS," BRISBANE SHOW, 1926.
Owned and exhibited by Mr. A. N. White.

the child and of the junior farmer; one little chap interested in Pig Clubs remarked to the writer, "I wish my dad would only come and see the pigs, for the pigs on our farm are simply awful and the pigsties wouldn't keep a bandicoot in."

Viewed, therefore, from these several angles, the exhibition of stud pigs at such a function as the annual shows of the Royal National Agricultural Association, and at similar shows throughout the State, has a far-reaching effect on the industry, one it is difficult to figure out in terms of pounds, shillings, and pence.

Viewed from the effect the stud sales and the consequent distribution of stud animals has upon the quality of the pigs coming forward to our bacon factories, it will be noted that, as far as the pig world is concerned, there are no more important occasions throughout the year than the annual live stock exhibitions and sales, for per medium of the stud sales more breeding stock go out to farms in widely scattered areas throughout the State than at any other period during the whole of the twelve months.

To the Queensland Branch of the Australian Stud Pig Breeders' Society the occasion of the Royal National Show and the stud stock sales are of much value, for gathered together on these occasions are farmers from every part of this and the sister States; this means that the annual general meeting of members of the Society, which for convenience sake is usually arranged during show week, is much more largely attended than would be possible otherwise. In addition, that portion of the meeting taken up in a general discussion of matters of import to the pig-raiser, and in which pig-raisers and others interested are invited to take part, whether members of the society or not, is of greater value and interests more folks than if it were a mere formal meeting for the despatch of official business.

Finally, looking at it, as it were, through the eyes of the Royal National Agricultural Association, the Pig Section is one of far-reaching importance, for it not only attracts a large proportion of exhibitors but as a live stock section it draws a crowd of spectators. It is one of the sections which together go to make up the show. To the pig-raiser the Royal National Show would be of minor importance were it not for the attractive schedule of prizes and the added opportunities offering for the disposal, per the stud sales, of the stock he has available for sale.

As showing the wide distribution of stock from these sales, it might be mentioned that the following represent the principal centres to which stock purchased at this year's stud sales were despatched, viz.:—(Note.—The figures in brackets represent the number of pigs.)

In the North—Ana Branch, via Ayr (1), Gladstone (4), Miriam Vale (2), Murray's Creek (1).

Callide Valley, via Rockhampton.—Thangool (1), Biloela (6).

South Burnett District.—Kingaroy (3).

North Coast.—Gympie (1), Eumundi (5), Yandina (1), Kureelpa, via Nambour (1), Maleny (2), Peachester (2), Kilcoy (2).

Brisbane and Metropolitan.—Suburban (2), Sandgate (1), Dunwich (2).

South Coast.—Canungra (1), Beaudesert (7), Oxenford (1), Wangalpong (1), Kingston (19), Ormeau (1).

Brisbane Valley.—Esk (2), Toogoolwah (1).

Lockyer Valley.—Gatton and College (5).

Fassifern Valley.—Boonah (1), Maroon (3).

South-west and West.—Morven (1), Dirranbandi (3), Kaimkillenbun (3).

Interstate.—Botany (1), Burra Burra (2), Dryaaba (2), Murwillumbah (2).

It is safe to say that had seasonal conditions been more favourable and the price of maize and other feeding stuffs more within the reach of the pig-raiser this distribution of stock would have been much greater. Had sales been more brisk, local and interstate exhibitors would not only have sold more animals but they would have made many more purchases themselves. At last year's sales and at the sales of a year or two since, animals were despatched to New Zealand, South Australia, and several consignments to the Atherton Tableland in the North, while interstate purchases absorbed a goodly number of the best animals available.

As showing the wide field from which exhibits are drawn to the pig section at the Brisbane Show it is interesting to note that Tasmania was represented by two exhibitors, one from Moonah, via Hobart, and one from Wilnot in the north-west of

that island. Victoria sent one of her best judges to adjudicate in the Berkshire section. New South Wales was represented by one of its most popular pig judges, and also sent along nine exhibitors, while from this State there were twenty-three exhibitors in the Pig Section, the writer as a judge in several sections, and twenty or more contestants in the Young Judges' Competition (Pigs).

The Championship Winners.

Reference is made on another page to the prize winners generally, hence we shall refer here only to the championship winners in the several breeds exhibited.

In the Berkshire section, which usually heads the list in so far as number of entries are concerned and general average quality, the Mental Hospital at Goodna were awarded the male championship, their boar "Erentwood Star" (4374) having also won similar honours at the 1925 exhibitions under the late Mr. W. J. Warburton's ownership. With the partial dispersal of the Northgate stud the Goodna Hospital became the possessors of this championship winner, a boar sired by a well-known Southern champion, "Bylands Nugget" (3800). The reserve championship in the male classes was annexed by the Westwood Farm Home for Boys with "Waterview Beau" (7566), a wonderfully developed fifteen months' old sire, by "Claremont Tom-nant" (6070), a well-known Tasmanian prize winner. This particular boar has an interesting record. He was in the first instance a free gift to the Farm Home, given in replacement for an animal purchased at the 1925 exhibition and which, unfortunately, died a few weeks after. It is to the credit of the donor, Mr. L. S. Ducat, that he forwarded such an excellent specimen of the breed, a boar that will do both studs credit. He won championship honours also at Toowoomba some months ago.

In the Berkshire sow classes, the championship went to a Tasmanian-bred sow, "Wilmot Cecile" (6754), shown by Mr. H. J. Keevers, of the Richmond River, N.S.W. This sow was purchased by Mr. Keevers as a youngster at the Sydney Show, and has since developed into a very fine quality animal. The reserve championship found its way to the exhibit in the under 12 months' old class penned by the Dunwich Benevolent Asylum, an institution which has recently come to the fore again with its stud stock. They were noted prize winners many years ago and have turned out many useful animals. This sow was sired by "Conargo Skipper" (5737) and had as her dam "Parramatta Joyce" (5864), both animals purchased for Dunwich by the writer a couple of years ago.

The Yorkshires.

The Middle Yorkshire breed, one of the most popular and successful in the State of Victoria and a breed with a wonderful reputation overseas, does not "take on" in Queensland to the same extent as the black with white points and the red breeds, nor have they ever attracted more than one or two exhibitors; on this occasion the breed was represented by four animals only, all shown by the Trustees in the Estate of the late Mr. W. J. Warburton, the male championship winner "Newington Adventurer" (2090) having scored similar success at previous Brisbane and Sydney shows, as also was the case with the female champion "Newington Snowflake" (2693), both animals being bred at the State Hospital, Newington, N.S.W.

The Tamworth.

The Tamworth section was well represented and the quality well up to the average, though several inferior males were penned, pigs which should have not been entered at all; it is these inferior types, and pigs which appear weak and undeveloped, which do this breed more harm than anything else, for the Tamworth never was and never will be a "sty pig"; he finds his most suitable environment in the field grazing and hunting up his living under comparatively harsh conditions—conditions under which some of "the sty bred" pigs would fail to develop or to prove profitable. The Tamworth has attained phenomenal success during recent years, a period during which the demand for fleshy meat has been steadily increasing.

The championship winner at last Sydney Show, Mr. F. Ebberts's "Blakeney Sidney" (389), was again successful. He hails from Kelso, near Bathurst, N.S.W., and was bred at the Hawkesbury Agricultural College, Richmond, N.S.W., a stud carrying some very fine quality Tamworth and Berkshire pigs. The reserve champion winner, Mr. A. N. White's "Blakeney Special" (549), bred by exhibitor topped the list when it came to the stud sales, changing hands and becoming the property of Mr. H. J. Keevers at 25 guineas. He was a remarkably well developed, typical sire, and should be heard of again at future shows.

A well-known champion, Mr. A. N. White's "Blakeney Ribbons," was adjudged the champion sow. She also was bred at the Hawkesbury College, and was under offer for some time last year to the writer on behalf of a New Zealand friend, who will



PLATE 67.—CHAMPION BERKSHIRE SOW, "WILMOT CECILE," BRISBANE SHOW, 1926.
Owned and exhibited by Mr. H. J. Keevers.



PLATE 68.—CHAMPION BERKSHIRE BOAR, "BRENTWOOD STAR," BRISBANE SHOW, 1926.
Owned and exhibited by the Mental Hospital, Goodna.

now regret not having completed the deal. "Ribbons" is a very well developed sow of a deep-bodied, roomy type. The reserve champion sow was also the property of Mr. White, "Blakeney Singer" (491) by name, and a sow of good quality.

The Poland-Chinas.

The black with white points breed of America, the Poland-China, has forged its way to the front rank in recent years, and has attained a widespread popularity. It is a breed one needs to understand in order to secure the best results, for both male and female have a tendency to "run to fat" unless given abundant green food and compelled to take regular exercise. They are a breed out of which more advantage will be gained by crossbreeding with the Tamworth than if used in the pure state, this particularly so where the objective is "bacon pig" production. Mr. A. N. White again secured the championship, this time with "Blakeney Royal" (158), another product of the Hawkesbury College stud. The reserve champion, Mr. A. T. Beezley's "Orara Adonis" (273), was also a reserve champion winner at last Sydney Show, at which Mr. Beezley purchased him from his breeder, Mr. C. J. Frank. He is a neat attractive boar of up-to-date type.

In the female classes, Mr. A. N. White's "Danesboro Winifred" annexed the red, white, and blue; she is a well-known prize winner and a daughter of a former champion at Sydney. The reserve champion sow was selected from the younger sows, and in this case the winner was Messrs. Yalden Bros., with "Boynes Wood Stella" (321), an excellent quality sow.

The Duroc-Jerseys.

The latest introduction from America and from Canadian studs, the Duroc-Jersey, was well represented at this year's show though, in point of number of exhibitors, they were limited. However, the four exhibitors—Messrs. Brown Bros., of Mooroombin, Percy Campbell, of Lamington, Mr. H. Bruxner, of Beaudesert, and Mr. Leo. Delroy, of Murgon—are all enthusiasts in the breeding of these red pigs, and they all report much success, both with the pure-breds and with the crosses with the Berkshire and similar types. The championship in the male classes went to Percy V. Campbell's "Taldra Imperial" (63), a recent purchase from the South Australian Duroc Stud of Mr. W. H. Bruce, and a boar, the direct progeny of recently imported strains in this now popular breed. The original importers of this type, Messrs. Brown Brothers, of "Mooroombin," Toogoolawah, were successful in winning the female championship on this occasion with "Mooroombin Sunset" (1), one of the original importations. There were many other useful quality pigs in these several classes.

The Gloucester Old Spots.

This is a new breed that so far has not been given much publicity. It is an old-time English breed with a wonderful reputation overseas; a breed possibly destined to occupy an important place in our pig industry, but a breed which is somewhat unattractive in appearance to the inexperienced breeder, a breed which will have a rather tough row to hoe before it reaches the front rank in the estimation of breeders more accustomed to the neater bodied, more compact—and in that sense more attractive—types like the Berkshire, the Yorkshire, and even like the Tamworth and the American breeds. There were but two exhibitors, and no championship awards.

Pork and Bacon Pigs.

In one sense the pork and bacon pigs were a disappointment, though there were a dozen entries all told. This is a section which needs revision before it is placed on a satisfactory basis, and it will probably be found eventually that carcass contests will be very much more profitable and instructive than the penning of whatever animals exhibitors can hunt up for this section of the show.

Non-Competitive Model Bacon Pigs.

An effort was made this year to pen six non-competitive model bacon pigs; six pigs were penned, three of the Tamworth-Berkshire type and three of the Berkshire type. They filled a useful purpose as indicating something of the type of bacon pig required by the factories, but they were variable in weight, a fact stressed at each of the lectures given by the writer at this pen during the currency of the show. It is hoped to have this feature again at next year's show and to enlarge on the present system if possible.

Altogether the Pig Section proved an attractive and interesting one, one justifying the expenditure, and one well worth enlarging and making better provision for at future shows.

Answers to Correspondents.

BOTANY.

In the course of the month the Government Botanist, Mr. C. T. White, F.L.S., addressed the following replies to correspondents, and which are of general interest.

Vernacular Names of Plants.

A.B.C. (Clifton)—

As a general rule, shrubs and many plants in common garden use have no set vernacular names, the botanical ones being usually employed by gardeners and in the horticultural trade generally. Sometimes vernaculars are given that are mere translations of the botanical names. Of the list you send, the best I can do is—

Buddleia Veitchiana (Veitch's Buddleia).—Messrs. Veitch and Sons are famous English nurserymen, who have had collectors in various parts of the world collecting plants.

Habrothamnus elegans (Purple Haborthamnus).

Photinia serrulata (Chinese Hawthorn).

Pittosporum undulatum.—This species can be labelled simply "Pittosporum," for it is this species that is generally known by this generic name to cultivators.

Ochna mauritiana (Bois Bouquet of Bois Jasmin of the French people of Mauritius).

Choisya ternata (Mexican Orange Flower).

Escallonia macrantha (large Red-flowered Escallonia).

Polygala grandis (large-flowered Polygala).

Sandalwood—Wilga.

A.T. (St. George)—

1. There are two species of "Sandalwood" cut and exported from Australia—a Western Australian species (*Fusanus spicatus* or *Santalum cygnorum*) and a Northern species (*Santalum lanceolatum*); the Northern tree extends throughout North Queensland, the Northern Territory, and the North-west of Western Australia. It is generally regarded as the more valuable of the two; the chief port of export is Thursday Island. A strange feature about this tree is the fact that it extends through Southern Queensland right into New South Wales; but as the tree comes south it loses its valuable properties, the wood of the southern trees being quite scentless.

The Buddha tree, known in Western Queensland almost universally as "Sandalwood," does not belong to the "Sandalwood" family, but the Myoporaceæ; the wood of several trees of this family is similar to Sandalwood, but the Chinese will not accept them; the wood contains no "santalol," the active constituent of Sandalwood oil. The Buddha Tree (*Eremophila Mitchellii*) has a much smaller, narrower leaf than the true Sandalwood; it is also a smaller tree.

2. The Wilga (*Geijera parviflora*) is a valuable fodder tree, though opinions regarding it differ very considerably. An analysis made by Mr. F. B. Guthrie, one time Government Agricultural Chemist of New South Wales, was as follows:—Water, 47.73 per cent; ash, 5.21; fibre, 7.61; albuminoids, 14.25; carbohydrates, 23.02. Nutrient value, 42; albuminoid ratio, 1—2.

"Bean Tree" (*Castanospermum australe*).

E.G.S. (Cairns)—

The bean forwarded belongs to the "Bean Tree" or "Moreton Bay Chestnut" (*Castanospermum australe*). The large seeds are poisonous, causing severe gastro-enteritis, and often death in cattle and horses. This is due to a poisonous saponin. The beans, however, were eaten in former days by the natives; they, however, scraped them very finely, placed them in a dilly-bag in running water for about forty-eight hours, and then cooked them.

Zieria Smithii—Baccharis halimifolia.

The specimens are the small bush with a rather strong smell—*Zieria Smithii*, a very common shrub on scrub farms in coastal Queensland. The leaves contain a prussic-acid yielding glucoside (like sorghum), and if eaten in quantity may cause death. So far as I have observed, however, stock eat the shrub to a very limited extent.

The coarser shrub is *Baccharis halimifolia*, the tree Groundsel, a native of South America, common as a naturalised weed in Queensland. As the plant had been suspected on several occasions of causing death among stock, feeding experiments were made with the plant, but these yielded negative results. Stock as a general rule do not take to this plant unless forced to do so by hunger. A leaflet on the plant has been posted for your information. Personally, I rather doubt either plant being the cause of your trouble, and would be inclined to look elsewhere; if further losses are occurring or one feared, perhaps an inspection could be made of your paddocks.

“Royal Blue Grass” (*Andropogon intermedius*).

A.H.H. (Wollongbar, N.S.W.)—

Your specimen is *Andropogon intermedius*, a native of Queensland and New South Wales and extending from the coast some distance inland. The grass produces a fair amount of palatable, though, perhaps, rather coarse, forage. I have not heard a local name applied to it. Mr. Breakwell in his “Grasses and Fodder Plants of New South Wales” gives the vernacular “Royal Blue Grass.”

“Native Lucerne” (*Psoralea leucantha*)—“Native Plumbago.”

R.P. (Richmond)—

The plant forwarded is *Psoralea leucantha*, a native of the North Queensland Gulf country and the Northern Territory. I have had no previous experience with this plant as a fodder, but I know that others of the same genus (*Psoralea*) are common in Queensland and other Australian States, and are generally regarded as useful and nutritious fodders. Several go under the name of “Native Lucerne”; they are legumes and are not known to possess any poisonous properties. Some years ago I was up in the Julia Creek district, where a great many losses among sheep had occurred, and I came to the conclusion that they were caused by sheep eating the “Native Plumbago,” a small shrub with typical “Plumbago” flowers and small sticky pods, that was common in the scrubby patches on ridges above the river. Eradication of this plant was advised, and the owner wrote me later that his losses had ceased. This particular plant may be worth looking for on the holding mentioned.

Plants Identified.

K.O’S. (Taroom)—The specimens sent proved to be—

2. *Acacia salicina* var. *varians*.—Sometimes known in Western Queensland as “Black Wattle,” a name, however, given in Queensland to a number of different species of *Acacia*.
3. *Acacia fasciculifera*.—Sometimes known as “Ironwood Brigalow.” A very hard timber, durable in the ground.
4. *Abutilon oxycarpum*.—A small shrub of the Mallow family (*Malvaceæ*). I have not heard a common name for it.
5. *Olearia stellulata*.—Daisy Bush.
6. *Solanum ellipticum*.—Potato Bush. The green berries are reputed poisonous.
7. *Bursaria incana*.—A small tree said to be good forage.
8. *Vernonia cinerea*.—A common weed of the Composite family (*Compositæ*). I do not know a vernacular name for it.
9. *Abutilon auritum*.—A small shrub of the Mallow family (*Malvaceæ*). I have not heard a common name.
10. *Turraea pubescens*.—A shrub, commonly leafless, or nearly so when in flower.

“Honey Bean” (*Gleditschia triacanthus*).

A.B.C. (Clifton)—

The tree commonly known on the Downs as “Honey Bean” is *Gleditschia triacanthus*; the “Honey Locust,” a native of Central North America, widely cultivated as an ornamental tree throughout the temperate parts of the world. Agapanthus, is, of course, a very different plant—one of the Lily family (*Liliaceæ*).

***Lobelia purperascens*.**

G.M.W. (Waterford)—

The small plant of which you send a specimen is *Lobelia purperascens*. It is very common in Southern Queensland, but I have never heard a common name applied to it. The small stems exude a milky juice (sometimes not very copious) which has been used as an external application to cuts and sores. I have never heard of the plant before as an antidote for snakebite; taken internally it might prove dangerous, as the plant belongs to a genus (*Lobelia*) which contains several poisonous species.

Red Ash—“Coffee Bush”—“Quinine Berry.”

C.O’S. (Taroom)—Your specimens proved to be—

1. The tree with the leaves silver underneath—*Alphitonia excelsa*, the Red Ash. This tree grows both inland and on the coast. The very young twigs when peeled of bark often emit a very strong smell of sarsaparilla. The leaves are liked by all classes of stock and are a valuable standby in times of drought. Sometimes the tree is called “Silver Wattle,” but, of course, it is not a wattle.
2. The tree with small red berries—*Breynia oblongifolia*, sometimes called coffee-bush on account of the red fruits, but is in no way related to the true coffee.
3. The tree without silver leaves and berries—*Petalostigma quadriloculare*. At times the tree is covered with rather large yellow “berries”; these are extremely bitter, hence the tree is often called “Quinine Berry.” The bark also is bitter.

It is always best to number specimens, retain a duplicate similarly numbered, and names will be returned to numbers each time; for instance, start the next sending with No. 4. Notes such as you send about the wood of the “Quinine Berry” are always acceptable.

VETERINARY.

Subjoined are selected replies to correspondents by officers of the Veterinary Staff in the course of the month, and which are of general interest:—

Greasy Heels.

The successful treatment of a draught mare with greasy heels depends on the length of time the animal has been in this condition, her age, and the nature of the food and surroundings.

Give the mare a physic ball made up as follows:—Barbadoes aloes, 6 drachms; extract of belladonna, $\frac{1}{2}$ drachm; powdered ginger, $\frac{1}{2}$ drachm.

Prepare the mare with two bran mashes, six hours apart, and fast her for sixteen hours, keeping ample water beside her. Then ball her and do not give her any green food until the physic has set. Clip all the hair off the affected parts and wash well with soap and water. Next, dry thoroughly by painting the part with methylated spirit, and do not touch it with water after the cleansing process is complete.

Then dust it thoroughly with acetate of lead, 1 part; sulphate of zinc, 1 part.

Successful treatment depends on keeping the mare out of the wet and muddy water-holes.

Give her the following powder in her food once every day for fourteen days:—Epsom sales, 1 oz.; powdered gentian, 1 drachm; powdered sulphate of iron, 1 drachm; powdered aniseed, 1 drachm.

Foul in the Foot.

Case: A calf is suffering with a disease of the foot. The disease is a series of cracks just above the hoof and on the back of each of her four feet, and appears to be extending to the front. The legs are swollen and cause the animal great pain. Her appetite is exceedingly good, but she moves about with the greatest difficulty, and is beginning to get poor, irrespective of the fact that she is being hand-fed. She has had the complaint for about three or four months.

Reply: From the symptoms described, it appears as if the animal is suffering from what is known as "foul in the foot." In such a case, the affected foot should be thoroughly washed with clean tepid water. A pad of cotton wool soaked in a saturated solution of blue stone should be placed on the affected parts, and kept in position by means of a bandage. This treatment should be repeated daily until the wounds have healed.

Peculiar Smell in Milk.

Case: A cow's milk, after standing about eight hours, has a peculiar smell and becomes a dirty grey in colour. The cow appears to be in good health, and is being milked twice daily. She calved on the 13th May, and it is only within the last few days that anything wrong has been noticed with her milk. Why should a cow vary in her milking to the extent of a gallon in twenty-four hours? The weather is warm and she is on her usual feed.

Reply: Give the cow the following drench:—1 lb. Epsom salts, 1 oz. hyposulphite of soda, 2 oz. powdered gentian, 1 oz. powdered ginger, 1 lb. molasses, 1 gallon water. Drench her after a twelve hours' fast. Flood out the uterus with 30 grains of permanganate of potash and 1 gallon of water once every day for fourteen days. The variation in the milk supply is probably due to the period of oestrus, which continues for about twenty-four hours and varies sometimes one way or the other, depending on the animal's condition and general health.

Blood Scours.

Case: Out of twelve heifers saved, six were reared. When from three weeks to two months old, they got the usual scours, and then after several days, instead of the scours it was pure blood. Some of them died after a couple of days, and others lingered on for weeks. Every effort was made to save them. The inquirer gave them his fingers to suck in the milk, and even went so far as to give one a bottle. It lingered on for about five weeks, but did not improve.

Reply: These animals suffered from what is commonly known as blood scours, which in the majority of cases proves fatal. In treating such cases, the animal should be given two table-spoonsful of castor oil, and after this has operated, a mixture of one ounce of sulphuric acid and one pint of cold water. One teaspoonful of this mixture added to half a pint of water should be given in the form of a drench daily until the disease disappears.

Milk Fever.

Case: Snakebite was suspected as the cause of death of a cow. Without a knowledge of symptoms, either before or after death, the cause was indefinite. The cow was in great condition, and left the yard after morning milking quite all right. In the evening she was found off her legs—at least she was unable to come home; she struggled to rise, but was not able. The following morning she was much worse, and when seen was thoroughly out to it. Her eyes were inflamed, breathing was heavy, and there was an occasional spasm of pain, which it was thought indicated inflammation of the bowels. She was drenched a couple of times, but soon after she died. A post-mortem showed no inflammation of the bowels; there was no sign of inflammation, either in bowels or paunch, and liver and kidneys were perfectly sound; lungs were slightly touched, but not of any consequence; the heart was quite empty; not a drop of blood appeared to be near it. It looked as if the blood had failed to circulate, and the heart had pumped dry. That was the only unnatural appearance discerned.

Reply: In cases of snakebite, putrefaction of carcass sets in early, and the hair is easily pulled off the skin. Particulars as to date of calving and whether she was in calf again are not available, but strongly suspect milk fever as the probable cause of death. Probably the drench entered her lungs and brought on a slight mechanical pneumonia, which assisted to kill her.

Worms in Horse.

Case: A horse was fairly fat, and suddenly he started to fall away, and his coat got fairly rough; thought he had worms, and gave him a drench of a pint of raw linseed oil and 2 oz. of turpentine. He passed a lot of worms; so gave him another dose a fortnight later, but he is still the same, and is inclined to be hide-bound.

Reply: The horse referred to is apparently suffering from worms, and it is recommended that he be given one of the following powders, night and morning, for six days, mixed in the food or in a little water, and given as a drench:—1 drachm tartrate of antimony, 1 drachm Barbadoes aloes, 1 drachm sulphate of iron, $\frac{1}{2}$ oz. aniseed. A pint or so of linseed jelly mixed with the food daily would also be of considerable advantage.

PIG RAISING.

Following are selected replies to correspondents by the Instructor in Pig Raising (Mr. E. J. Shelton, H.D.A.) in the course of the month, and which are of general interest:—

Pig Raising as a Sugar-grower's Side Line.

With special reference to pig raising as a "side line" to sugar-cane growing in the Proserpine and surrounding districts on the North Coast of Queensland: It is true that from a general survey of these districts it appears that sugar-cane growers depend entirely on "cane" as the one and only industry in which they engage and are interested, but this does not signify that other industries are not possible or profitable. To us it signifies that sugar-cane has in the past been such a profitable crop that those farmers engaged in the cultivation of this crop have devoted the whole of their energies to the one crop, and have not bothered about pigs, or cows, or other branches of agriculture. Of course, the Proserpine district is somewhat isolated as far as pig raising is concerned, for there are but limited local markets, and there is no export of pork from Bowen, or even from Townsville, 170 miles further north, or other ports within easy reach on the southern side of this township. This makes it somewhat difficult for the man with a few pigs to sell, but conditions are changing, and many farmers in the sugar-growing districts are now looking round for fresh avenues of income, and a good deal of attention is being directed to pig raising as a possible way out of the difficulty in so far as finding a market outlet for farm crops are concerned. There is a bacon factory (Messrs. Conaghan Brothers, Limited) at East street, Rockhampton, 277 miles south of Proserpine, while the fresh pork market at Townsville, 159 miles further north, is a fairly good one. Pig raising is essentially a crop-growing proposition when considered from the mixed farming point of view, hence the success or otherwise of the venture will depend largely on the fertility of the land and methods of cultivation. Climatic conditions at Proserpine are, of course, essentially tropical, but that does not indicate that stock raising is not possible. Stock require to be handled on correct lines to ensure success. We shall be pleased to supply any detailed information required in connection with this industry on request.

Condition of Boar.

It would appear from your letter that your boar is overfat and lazy, and that he lacks a sufficiency of exercise and green food. We recommend reducing his condition, compelling him to take active and regular exercise, giving him a liberal supply of green food, but very little grain or meal and ample drinking water. It would pay, also, to give him two teaspoonsful of Epsom salts in his drinking water or milk every morning for one week, then again in two or three weeks' time. It would be as well to allow him to run with the sows part of the time and to keep him in a well grassed pig paddock in preference to a pig sty. Pea meal given as a mash mixed up with milk is advised for a trial. This is often effective in freshening up a boar. You could obtain stimulants (drugs) from Surgical Supplies, Limited, Brisbane, but these should only be used as a last resort. Of course, the trouble may be due to some abnormal growth at the point of the sheath or to inflammation. In this case it would require veterinary attention.

General Notes.

Bathurst Burr, Galvanised Burr, &c.

By an Order in Council, Bathurst Burr (*Xanthium spinosum*), Galvanised Burr (*Bassia Birchii*), and Noogoora Burr (*Xanthium Strumarium*) have been declared to be noxious plants for the purposes of the Land Acts (1910 to 1925). These are, in addition to Prickly-pear, Zamia, and Desert Poison Bush, already defined as noxious plants by the 1910 Land Act.

Staff Changes and Appointments.

The following appointments have been made at the Agricultural Bank, Brisbane:—Mr. T. R. Quinn, Sub-Accountant; Mr. F. A. McMahon, Applications Officer; Mr. O. W. Whittaker, Clerk (Arrears); Mr. W. B. Smith, Sales and Possessions Officer; Mr. J. T. McGuckin, Clerk (Securities); and Mr. C. W. Andrews, Clerk (Securities).

Messrs. J. Carew and N. E. Goodchild, Senior Field Assistants, Cotton Section, Department of Agriculture and Stock, have been transferred to Ipswich and Maryborough, respectively.

The Royal Society of Queensland.

At the last ordinary monthly meeting of the Society in the Geology Lecture Theatre of the University, Prof. E. J. Goddard, B.A., D.Sc., presided.

Dr. W. H. Tilling and Mr. S. Stephenson, M.A., were nominated for ordinary membership.

The Chairman extended the best wishes of the Society to Mr. Owen Jones, B.Sc., who is also well known in yachting circles as skipper of "Caress," Queensland's representative in the Australian championship and Forster Cup series, and who was about to leave for a post-graduate science course at Cambridge University.

Mr. H. A. Longman, F.L.S., exhibited the symphyseal portion of mandible with remains of two incisors of *Diprotodon minor* Huxley. The specimen was obtained near Murgon, South Burnett, and handed to Rev. C. H. Massey, by whom it was donated to the Queensland Museum.

Prof. H. C. Richards, D.Sc., communicated a paper by Capt. J. A. Edgell, R.N., entitled "Report on Solar Phenomenon Observed by H.M.A.S. 'Moresby' on Wednesday, 4th November, off the East Coast of Queensland." The paper describes and illustrates a halo around the sun observed near Keppel Island.

Dr. W. H. Bryan, M.C., read a paper entitled "The Earlier Palæogeography of Queensland." The author discussed the several views as to the shape and extent of the primeval Australasian continent, and with the aid of lantern slides traced the history of its growth period by period through the Palæozoic Era. Throughout the whole of this time the western half of Australia remained a land mass, while on the other hand much of Eastern Australia was covered by a succession of seas. To the east of these again in the positions now occupied by the Coral and Tasman seas, and possibly extending as far as New Caledonia and Fiji, there probably existed a great land mass which has been lost to Australia by a series of foundering movements which may have begun in Permian times. Thus the Palæozoic seas of Eastern Australia would appear to have been elongate and limited by land masses on each side just as the Mediterranean Sea is at the present day.

Dr. F. W. Whitehouse, M.Sc., read a paper by Dr. W. H. Bryan, M.C., and himself entitled "The Later Palæogeography of Queensland." The authors show on their map a greater extent for the Triassic lakes (in which the Ipswich coal measures were deposited) than has been recognised previously. Evidence is given indicating that, during the period of deposition of the Walloon coal measures, several transient incursions of the sea took place in the area. During the succeeding (Cretaceous) period the sea occupied the central portion of the continent extending, apparently, from the Gulf to the Bight. Continuous deposition was arrested by a temporary return to land conditions before the final stage of flooding by the sea. The close of the Cretaceous marked a return to lake conditions. The deposits of the Tertiary period are known only from isolated areas, all more or less near the east

coast, the precise extent of the lakes in which they were formed being unknown. It is suggested, however, that during the Tertiary period the shore line was not far from its present position.

Dr. E. O. Marks, Prof. H. C. Richards, and Messrs. A. K. Denmead, C. Ogilvie, H. A. Longman, C. H. Massey, and Prof. E. J. Goddard commented upon the papers.

Pomelos, Shaddocks, and Grape Fruit—Citrus Nomenclature.

There is a great deal of uncertainty in this State respecting the nomenclature of the different types of citrus fruit belonging to the genus *Citrus*, species *decumana*, but it may be stated that all pomelos, shaddocks, forbidden fruit, and grape fruit are all types of one species of citrus fruit, viz., *Citrus decumana*. They are all pomelos in the same way that all varieties of mandarins are called mandarins and all varieties of oranges are called oranges; but they are distinguished from all other species of the genus *Citrus* by the size of the flowers and the manner in which the flowers are produced, by the shape and size of the leaves, the petioles of which are winged, the wings varying in size in different varieties but resembling each other in shape in that they are usually roundish or oblate and not elongated. The flesh of the fruit is also quite distinct from that of other citrus fruits in that the pulp contained in each section of the fruit consists of a number of particles which vary considerably in size, but which have one character in common, in that each of these particles is quite distinct and is easily separated from the adjacent particles. The skin surrounding each division of the fruit is also very tough and usually bitter.

The skin proper is usually smooth and of a pale yellow colour, and the inner skin is a white pithy substance that varies greatly in thickness and bitterness, some fruit having a heavy pith which is so bitter that it is used for making "Pomelo Bitters," whereas in others it is much thinner and of a bitter-sweet taste.

The fruit varies in size from about 3 inches to 10 inches or even more in diameter, as well as in shape, as it may be oblate, round, oval, or pear-shaped. The colour of the flesh also varies from green to red with many shades between the two extremes. The flavour of the flesh also varies very much, as some fruit are distinctly acid, whereas others have a pleasant sub-acid, slightly bitter taste, and some are decidedly bitter.

The pomelos are quite distinct from the so-called Poor Man's Orange, of which there are many types in this State, as the latter are types of the smooth-leaved Seville orange *Citrus Bigaradia*, which is frequently sold as a grape fruit, very much to the detriment of the latter, which it does not resemble in the slightest, either in flavour, texture, or quality.

Sugar-cane Levy Regulations.

Regulations have been issued under the Primary Producers' Organisation Acts empowering the Council of Agriculture to make the following levies on canegrowers:—

One penny per ton on all sugar-cane delivered to the North Eton Mill; and

One halfpenny per ton on all sugar-cane delivered to the Moreton Mill—during the 1926-27 season.

These levies will be utilised for the purpose of the employment of growers' representatives at the North Eton and Moreton mills during the coming season.

Provision is made for the Council to make levies on the canegrowers in the following districts for the 1926-27 season at the following rates:—

Cairns mills, $\frac{1}{2}$ d. per ton; Innisfail mills, 2d.; Herbert River mills, 1d.; Kalamia and Pioneer mills, 1d.; Inkerman mill, 1d.; Invicta mill, 2d.; Proserpine mill, $3\frac{1}{4}$ d.; Mackay mills, $1\frac{1}{4}$ d.; Bundaberg mills, $\frac{1}{2}$ d.; Maryborough mills, 2d.; Southern District mills, $1\frac{1}{2}$ d.

These levies are to be paid to the Queensland Cane Growers' Council, which shall utilise them for the purpose of financing the District Cane Growers' Executives, Mill Suppliers' Committees, and Mill Suppliers' Associations in the various cane-growing districts.

Provision is also made that all the organisations handling these levies must furnish the Minister not later than the 31st March, 1927, with an audited statement setting out in detail the receipts from the various levies and the disbursements therefrom.

Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, cowpeas, sorghums, millet, panicums, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, tumeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of most vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Spraying for fungoid diseases should be attended to, particularly all members of the *Cucurbitaceæ* and *Solanum* families, of which melons and tomatoes are representative examples. Give plenty of water and mulch tomatoes planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also make a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant tuberose, crinum, ismene, amaryllis, panceratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphids, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

Orchard Notes for October.

THE COASTAL DISTRICTS.

October is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised, as, unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility of their being supplied with same. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture

or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as to prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will not only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growths should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of these spraying materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitaceous plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such diseases as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that the land is properly prepared and that good healthy suckers only are used. Keep the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy every fallen fruit. If this is done systematically by all growers early in the season, the subsequent crop of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Much of the matter contained under the heading of "The Coast Districts" applies equally to these parts of the State, as on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop

of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit is nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codlin moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruit are grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful check should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruits, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.

THE COW'S WATER SUPPLY—SLIMINESS IN MILK.

The significance of the cow's water supply in relation to the quality of its product is emphasised by recent field investigations on "slimy" milk. The investigations were made by a senior dairy instructor of the New South Wales Department of Agriculture in connection with the inferior cream delivered to a South Coast butter factory during a dry spell last summer, and the facts are worth noting by every dairy farmer.

The cream was comparatively fresh and presented no off flavour or smell at the time of arrival at the butter factory; its consistency, however, was distinctly abnormal. The particles of fresh casein appeared to be particularly adhesive, and thus produced the slimy character in the cream, which on being touched with a stirring rod could be drawn out into very long threads. This cream was set aside together with other low-grade creams to be subsequently manufactured into low-grade butter. It was noticeable with a check sample which had been under observation for about forty-eight hours that the sliminess had diminished and a putrid odour had developed.

From inquiries made it was learned that at least two dairymen in the locality were troubled with this slimy condition in their cream at the same time. These farms were visited and an endeavour was made to trace the source of trouble. The dairy buildings were well preserved and clean, while reasonable cleanliness was displayed in the treatment of all dairy utensils, &c. Milk buckets and separator parts were thoroughly washed and scalded each day before use. It was thus evident that the trouble was not directly due to the use of dirty utensils.

A sample of each cow's milk was then carefully collected into sterile vessels and kept under observation for a day. Several such milks showed the defect, and the responsible cows were sorted out and their milk kept away from the rest, but the cream from the herd still showed the defect.

It was observed, however, that on account of the prolonged dry weather the once running freshwater creek which flows through these dairy farms had become a chain of potholes. Bacteriological examinations of water taken from the creek revealed the presence of large numbers of organisms which were capable of causing "ropiness" or "sliminess" when inoculated into sterile milk. It was observed that many of the milking herd on their way to the bails would wade into this stagnant water to drink, and in doing so gathered on their udders and other parts of their bodies millions of objectionable bacteria which later found their way into the milk pails, where they would multiply rapidly and cause undesirable fermentation. One of the dairymen was fortunate in being able to remove his cattle to a better watered paddock, and was no longer troubled with "slimy" cream.

These results show the effect on the quality of both milk and cream of a stagnant water supply, especially one which is accessible to cows. Better results are obtained by troughing such water to minimise pollution and resultant infection.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

1926.	SEPTEMBER.		OCTOBER.		SEPT.	OCT.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.8	5.36	5.34	5.50	a.m. 1.39	a.m. 2.9
2	6.7	5.36	5.33	5.51	2.35	2.53
3	6.6	5.37	5.32	5.52	3.24	3.31
4	6.5	5.37	5.31	5.52	4.9	4.7
5	6.4	5.38	5.29	5.53	4.53	4.40
6	6.2	5.38	5.28	5.53	5.31	5.9
7	6.1	5.39	5.27	5.54	6.6	5.44
8	6.0	5.40	5.25	5.54	6.39	6.16
9	5.59	5.40	5.24	5.55	7.9	6.44
10	5.58	5.41	5.23	5.55	7.43	7.24
11	5.57	5.41	5.22	5.55	8.14	8.4
12	5.56	5.42	5.22	5.56	8.47	8.46
13	5.54	5.43	5.21	5.56	9.23	9.36
14	5.53	5.43	5.20	5.57	10.4	10.30
15	5.52	5.54	5.19	5.57	10.50	11.28
16	5.51	5.44	5.18	5.58	11.41	12.26
17	5.50	5.45	5.17	5.59	12.39	1.39
18	5.48	5.45	5.16	5.59	1.43	2.45
19	5.47	5.46	5.14	6.0	2.49	3.52
20	5.46	5.46	5.13	6.1	3.58	4.57
21	5.45	5.46	5.12	6.1	5.7	6.13
22	5.44	5.47	5.11	6.2	6.15	7.9
23	5.43	5.47	5.10	6.2	7.20	8.13
24	5.42	5.47	5.9	6.3	8.26	9.13
25	5.41	5.47	5.8	6.4	9.30	10.16
26	5.40	5.48	5.8	6.4	10.32	11.9
27	5.38	5.48	5.7	6.5	11.32	1.1
28	5.37	5.48	5.6	6.6	nil	a.m. 12.5
29	5.36	5.49	5.5	6.6	12.28	12.50
30	5.35	5.49	5.4	6.7	1.21	1.30
31	...	...	5.4	6.8	...	2.8

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

7 September ☉ New Moon 3 44 p.m.
 15 " ☾ First Quarter 2 26 p.m.
 22 " ☉ Full Moon 6 19 a.m.
 29 " ☾ Last Quarter 3 47 p.m.

Apogee, 7th September, 6 24 a.m.

Perigee, 21st September, 4 18 p.m.

On the 19th of September a conjunction of the Moon and Jupiter will take place about a quarter of an hour before the Moon rises at Warwick. It will, however, afford an interesting daylight spectacle soon after 3 o'clock in the afternoon when the planet should be seen to the left of the Moon, apparently at a distance of less than four times the diameter of the latter from the planet, although many millions of miles will actually separate the two objects.

Delta Capricorni will be occulted by the Moon on the 19th in Southern Queensland. About 9.30 p.m. the star will appear a little to the right of the Moon, which will obtrude itself between the star and the earth, a few minutes later. About 10.10 the star will again be seen on the opposite side of the Moon, low down to the left. The Moon being nearly full, binoculars or a telescope will be necessary to observe this occultation.

The beautiful planet Venus will no longer be such a brilliant object in the morning sky, as it will not rise until a few minutes after 5 each morning during the month, and the Sun will be rising only half an hour later at the end of the month, and it will be practically lost in the approaching daylight.

7 October ☉ New Moon 8 13 a.m.
 15 " ☾ First Quarter 12 27 a.m.
 21 " ☉ Full Moon 3 15 a.m.
 28 " ☾ Last Quarter 8 57 p.m.

Apogee, 4th October, 11 12 a.m.

Perigee, 20th October, 1 0 a.m.

October.—Mercury will rise 28 minutes before the Sun on 1st October, on the 15th at 1.18 before the Sun, and on the 31st at 1.49 before the Sun.

Venus will rise at 5.9 minutes before the Sun on 1st October, on the 15th at 7.55 p.m., and on the 31st at 6.26 p.m.

Jupiter sets at 3.12 a.m. on 1st October, on the 15th at 2.15 a.m., and on the 31st at 1.21 a.m.

Saturn sets at 9.13 p.m. on 1st October, on the 15th at 8.27 p.m., and on the 31st at 7.32 p.m.

An interesting spectacle may be seen on the evening of the 22nd when the Moon, rising soon after 7 o'clock, will appear to be attended by the planet Mars, which will seem to be about five or six times the diameter of the Moon to the north of it. Both objects will be in parts of their orbits, which bring them nearer than usual to the earth. The Moon will be at a distance of something like 230,000 miles, and the planet at the much greater distance of about 235 millions of miles.

No occultation of any popular importance will occur during this month, and most of the other phenomena either occur in the daytime, when unobservable, or are of little popular interest.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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PART 4.

Event and Comment.

The Current Issue.

The Fiji disease of sugar-cane is the subject of a special warning note by the Bureau of Sugar Experiment Stations. Useful entomological hints to cane-growers are continued by Mr. Edmund Jarvis. Agriculture in Queensland is reviewed interestingly by Mr. Quodling; and recent departmental action in respect to the checking of the spread of Bunchy Top disease in bananas is described. Mr. White has a note on some recently described plants which is illustrated excellently by Mr. Helmsing. Awards for the more important agricultural exhibits at the recent Royal Show are fully listed. Mr. Rumball has a note on poultry feeding, while Mr. Shelton discusses the points of the Duroc-Jersey pig. Recent visitors' remarks on Queensland's magnetic north are also presented. Efficiency in dairy production and contagious mammitis in cattle are included among other seasonal subjects discussed. The Journal is, as usual, well illustrated.

A Bush Home—An Artist's Impression.

A well-known Southern artist, Mr. D. H. Soutter, in describing his impressions of a recent tour through Southern Queensland, remarks that the dilapidated shack is rapidly disappearing in Australia. In opening new country the pioneer possibly begins with a very humble shelter. A tent, maybe, later supplemented by a bark hut, but in time, as his means permit, he builds a home that, for comfort and suitability, is as near perfect as possible. In the south-west of Queensland he was struck with the high standard of the newer structures which are rapidly displacing the old. One he had in mind is most picturesquely situated on the serpentine bend of a creek in the Maranoa district. Just built by a new settler there and his wife, who have designed themselves a most artistic home in an ideal situation. Eighty or ninety miles, maybe a hundred, from a town; so they deserve comfort and æsthetic surroundings. The land slopes pleasantly to the creek, which carries many flowering plants on its placid surface. An inch of rain sets it running so the weeds (?) are no menace. Wild duck are plentiful. A novel feature in the house is the living-room, two walls of which are merely wire-gauze between six-inch posts. In winter, wooden shutters keep out the cold winds. In summer these are removed and the gauze keeps out the flies and lets in the fresh air. The old homestead, which has been raised bodily on piles and connected with a gangway to the back of the house, is now the kitchen and storerooms. A garden is being planned between the house and the river, and an irrigation system installed.

Dairy Production—The Need for Economy and Efficiency.

Speaking at the recent Animal Husbandry Conference in Sydney, Mr. L. T. McInnes (Dairy Expert, N.S.W.) contended that Australia is faced with an immediate and pressing need for a substantial increase in dairy production. On the present average herd production, he said, it required the product of one cow for every three units of production to keep on feeding the present annual increase in our population. An enormous increase in production would be necessary, amounting this year to the yield of 55,000 additional cows, based upon present average yields. Should the stream of immigrants to Australia be augmented the necessity for a rapid expansion in dairy production would be intensified. During the past twelve months 486,000,000 gallons of milk were required to supply Australian home requirements, representing the product of 1,700,000 cows, and leaving a surplus for export from only 600,000 cows. It was obvious that unless steps were taken either to increase our herds or to improve their yields Australia in a few years would not only have no exportable surplus, but would be faced with a production insufficient for home needs. Dairy farmers should remember that there was a sure home market in Australia for increased quantities of dairy produce, stabilised by their own organisations. It was a startling fact that during the past ten years the inefficient feeding of dairy cattle in New South Wales had been responsible for a loss sufficient to pay for the whole of the stock of the State twice over. Our present-day herds, if fed well, would average 150 lb. of butter-fat per cow per annum, whereas the average for the past ten years had been only 100 lb.

Sheep on the Farm

At the same conference the benefits of sheep as an ordinary farm animal were discussed. Wheat, as is well known, is a most useful crop for improving the pastoral value of land; and, it was pointed out, the carrying capacity of any stock farm is very largely increased by the growing of crops and by the fullest use of all available

feed. Even if, it was held, only one or two hundred sheep were kept the return from them would be an appreciable factor in farm revenue. Sheep should be regarded as more than merely a grass eater. Grass is often sour and insufficiently nutritive in the winter, and the economy of providing fodder crops in addition would be demonstrated easily in much improved returns.

Renovation of Paspalum Pastures.

Pasture renovation experiments which are being carried out by Mr. C. S. Clydesdale (Assistant Instructor in Agriculture), under the direction of Mr. Quodling, have resulted in the accumulation of much interesting data. Comparisons between ploughed and unploughed and fertilised and unfertilised plots respectively have been made, full particulars of which are being prepared for these pages. Results from ploughed and unploughed land are sufficiently interesting to command special mention. One plot unmanured and *unploughed* gave an aggregate green-tonnage weight of 4.58 tons per acre, equal to a growth of 31 lb. of grass daily per acre over a period of 326 days, in the course of which seven cuttings were taken. Another plot, unmanured and *ploughed*, gave a corresponding return of 16.31 tons and 112 lb. of grass grown daily per acre. Eighty-one pound of grass daily, approximately a ratio in favour of four to one, was the gain effected by ploughing. The value of this method of reviving grass lands and increasing their stock capacity is, as a result of this and other tests, fairly convincing.

Maize Improvement.

The high yields obtained in the maize field trials carried out by Mr. C. McKeon (Assistant Instructor in Agriculture), and which have been extended over a considerable period, have demonstrated unmistakably the value of propagating high-yielding strains of seed. The departmental scheme of seed maize improvement, embracing maize breeding and seed selection work extending over a term of years, has already brought about a marked improvement in type and quality of the several varieties that find favour with Queensland growers.

The Journal.

In the Annual Report of the Department of Agriculture and Stock the following reference is made to the Journal:—"The 'Queensland Agricultural Journal' has maintained a high standard of agricultural journalism and as an official publication. That as a vehicle of current technical and practical information on farming problems and practice it is becoming more and more appreciated is evidenced by its widening circulation. It continues to be an active and useful educational medium. The aim of the Editor is to issue a publication of all-round value to the agricultural industry, and in this he has succeeded. Necessarily limited to the presentation of what may be termed educational matter, it cannot be regarded altogether as a journal of light agricultural literature, nor is it desired that it should be so. The Journal has, however, attained the position of a recognised authority on technical and scientific subjects in relation to the industry it serves. Officers of the Department engaged in scientific and technical work have been generous in regard to the number and value of their contributions. Their notes, observations, and findings as recorded have been quoted widely in the scientific Press of this and other countries; and through their efforts the Journal has acquired a high reputation which it continues to sustain."

Bureau of Sugar Experiment Stations.

FIJI DISEASE.

Fiji Disease is present in at least two Southern Queensland localities. To warn growers of its dangers, and to instruct them in the ways in which they can help to eradicate it, the subjoined note has been circulated among cane planters.

What is Fiji Disease ?

Fiji Disease is one of the *really serious* diseases of sugar-cane.

Fiji Disease has wrought *immense damage* in Fiji and on the Tweed, Richmond, and Clarence Rivers of New South Wales.

Fiji Disease is capable at any time, on the poorer classes of soils, of causing the *severest losses* in susceptible varieties.

Fiji Disease is caused by a *dangerous microbe* which almost undoubtedly belongs to a group called the Virus, to which the Bunchy Top microbe of Bananas also probably belongs.

Fiji Disease is an *infectious disease*. It is *distributed in diseased sets* and can also travel from plant to plant or even from infected fields to healthy fields many chains distant, being probably carried by insects, so care and patience will be needed if it is to be got rid of.

Fiji Disease is present in the Beenleigh and Maryborough Districts.

Fiji Disease has lately been found in the Beenleigh and Maryborough districts of our great sugar tract.

It has not yet done great damage, so *now* is the time to attack this new enemy of the Queensland sugar-cane grower.

Success in an attempt to combat this or any other plant disease is very largely dependent on the *willing co-operation* of the growers in the affected districts. Growers are, therefore, asked to read this circular carefully, and to give their very necessary help by following the advice given should the disease be found on their farms.

What to Look For.

When the external signs of Fiji Disease become apparent this disease is one of the easiest to recognise of all Sugar Cane Diseases.

Watch out for stalks and stools which are stunted and have short blunt leaves forming a fan-like top. Run your fingers along the *under surface* of these short leaves. If the stunting has been caused by Fiji Disease you will feel and see *thin galls* or lumps on the leaf blade and/or on the mid rib. These are true galls and *not kinks* in the leaf, measure from $\frac{1}{2}$ in. to 1 in. or more, and lie in an up-and-down position along the veins of the leaf or any part of it.

What to Do.

(1) The moment Fiji Disease is found on your farm, by yourself or anyone else, you should notify the Director, Bureau of Sugar Experiment Stations, Brisbane, of the occurrence, stating plainly the variety affected, size of field, and locality of farm. An officer of the Pathological Staff will carry out a campaign against Fiji Disease during the summer months, and it is essential that he should have this information. If necessary we will mail you special advice on your case. All dealings of this nature will be confidential, and no lists of affected farms will be published without the consent of the growers themselves.

(2) Never cut seed from or from near infected fields, especially on rich soil, as there the symptoms are less obvious.

(3) D. 1135 and Malabar are liable to much damage from Fiji Disease and should be discarded altogether at the first sign of Fiji Disease in them. Q. 813 is, so far as is known, fairly resistant. Of standover canes N.G. 16 is resistant. N.G. 15 (Badila) is also resistant, but its susceptibility to gumming makes it unsafe for the Beenleigh district.

(4) All fields more than 5 per cent. infected should be ploughed out on harvesting and green manure planted, or the land rested for a season.

Remember.

The Bureau is here to help you, but without your support it can do but little. Your Associations will be duly notified as to when to expect our Pathological Officer, so go over your farms and get whatever information you can about your own case ready and available for him to work on the moment he arrives, so that no time will be wasted.

The above instructions are essentially of a general nature pending the results of detailed investigations, but should be followed as closely as possible.

Prohibition of Removal of Cane Plants to Other Districts.

Measures are now being taken to prohibit the removal of cane plants from districts, including Maryborough, to the New South Wales border, and against the introduction of plants from New South Wales in order that other cane districts may be protected.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (22nd September, 1926), from the Assistant to Pathologist, Mr. N. L. Kelly:—

There are two factors more or less connected with pathology which are deserving of wider publicity than they at present receive. They are—(1) Irrigation; (2) Effective control of planting.

To an observer travelling to North Queensland for the first time, there are many striking impressions. On leaving Proserpine a dry belt is entered which is seldom blessed with rain. No crops relieve the monotony of the outlook. Though steep hills rise on the left they are comparatively barren. But, about 3 miles to the south of Home Hill, the desert begins to blossom like the rose. The change is absolutely phenomenal, and is due solely to the efficient utilisation of the liberal underground water supply, with which the deltas of the Burdekin, and, to a lesser extent, of the Haughton, are endowed. Irrigation is destined to play an increasingly important part in the closer settlement of Queensland. At present the Burdekin—a-half mile in width—is apparently dry, and the Haughton is merely a chain of waterholes, but for practically 30 miles the country is literally riddled with underground channels. The Inkerman Irrigation Scheme involves the sinking of wells or "spears," and the production and distribution of electric power; its cost being diminished by the growing demand. It is a great boon to the district, and there are signs that many owners of oil or steam-driven plants will eventually throw in their lot with the Government scheme. In the Haughton district there is an expansive lagoon which could easily supply twice the area it now does with water. In the season which these districts have just encountered, irrigation was submitted to a severe test, and came through it very successfully. Another district that must eventually irrigate is Rollingstone.

One cannot enter the Herbert River district without being favourably impressed by the control of the planting, which, by the farmers' own vote, was vested in the local (C.S.R.) mills, and which is being quietly and efficiently handled.

If other mills followed their lead our work in disease control would be considerably facilitated, and trained officers now employed on routine work, which is necessarily incomplete because of the wide areas traversed, would be set free to investigate the more important pathological problems—e.g., Disease transmission, varietal resistance, &c. The information on these points from outside sources is of insufficient value, because of the varied conditions under which it was obtained.

It would be a distinct advance if every mill had an officer—perhaps, the cane inspector—who would study the diseases prevalent in the district from the point of view of identification and control. In this way, especially in those areas where gumming is widespread, he could very materially assist both the farmer and the miller. Later, he could be depended on to pronounce fields safe or unsafe for seed purposes, and so, by preventing the planting of infected cane (which practice still prevails in many districts) he would be attacking the problem at its most vital point. Of course, notes would have to be kept dealing with every block of cane.

In the Herbert River district, in two years, gumming disease has been so reduced that there is every indication of the district being entirely freed from the disease within the next two years. At present, just following the dry spell, the only localities where gumming was to be seen, were Forest Home, Gairloch, and Halifax. This sound state of affairs, though aided by the drought, has been mainly brought about by the company's field officers seeing to it that susceptible and sensitive varieties, of which H.Q. 426 is the worst, be not planted. Penalties are

imposed if the prohibition is wilfully evaded. Compulsion, however distasteful it may be to some, is really the safest course for all concerned; and is apparently the only one whereby an organisation can obtain power; even if that power is desired for good purposes.

Haughton River District.

The incidence of disease at Giru is very similar to that obtaining at Ayr. B. 208 is highly infected with both Leaf Stripe and Mosaic. The diseased fields should be ploughed out, ploughed several times, and planted with another variety. There are several farms where B. 208 is apparently healthy. These could be used, cautiously at first, as sources of seed, though any stool showing the disease should immediately be eradicated.

The white section across the leaves is Sectional Chlorosis, so-called because it is a destruction of the Chlorophyll—green matter—of the leaf, in sections. It is comparatively harmless, and should not be confused with the leaf markings of Mosaic, which latter disease is best described as a mottling throughout the leaf; being more prominent on the young shielded leaves than on the older leaves whose markings are often due to minor diseases, such as Ring Spot, or to an unequal distribution of nourishment by the leaf veins.

It is remarkable the effect of good cultivation before planting in minimising the damage wrought by a succeeding drought. This was especially noted in the Herbert, where many farms into which the trash had been turned, followed later by green manure, showed an excellent strike and growth, though planted after four months dry weather, with two dry months succeeding. The rain now falling is a godsend to all 1926 plant cane, especially the autumn plant. Some fields at Toobanna vary so considerably in quality—sand and heavy loam—that it is strongly recommended to eliminate these inequalities by “scooping.”

Tully River District.

It is unfortunate that in this new and rich district, Leaf Scald already has a strong foothold. About six farms scattered around Birkdalla, Midgenoo, and Upper Banyan Creek are infected, and there may be still more, the time at my disposal being insufficient for a complete survey. A factor making for uncertainty as to the extent of infection, is the abundance of Top Rot throughout the district. One distinguishing feature of this latter disease is that it rarely attacks every stem in a stool, and, secondly, the inside of the stem is sound except where the rotting is in progress near the growing point. In this district Top Rot seems to be characterised by the stem coming to a spindle top, which was probably caused by the prolonged dry season this year.

Leaf Scald.—This disease was described in the April issues of “Queensland Agricultural Journal” and “Australian Sugar Journal,” &c., but a résumé of those remarks will not be out of place here.

Losses.—In susceptible varieties, H.Q. 426, N.G. 15, &c., 100 per cent. of infected stools are killed.

Symptoms.—The critical symptom is a long pure white streak, very narrow, running usually from the bottom of the leaf sheath along a vein to the margin of the leaf. The white streak soon becomes broader and the tissues adjoining it die. Very often there are to be found shoots along one or both sides, or from the base of the stem, and these usually show the pencil line. The top leaves are often very chlorotic—bleached—and are small and bunched. The dry weather has brought on the acute stage, wherein the canes wilt and die, and the pencil line is difficult to find.

Spread.—(1) By planting of infected sets; (2) By knives, in cutting a healthy after an infected field; (3) Probably by the agency of an insect or insects.

Cause.—The organism, abounding in the pencil lines, which causes the disease, is a bacterium species which is actively motile, and somewhat smaller than *B. vascularum* of Gumming.

Control.—(1) Eradicate infected fields after harvesting. The infection in a ratoon crop is always much larger than in the plant. (2) As the disease has been known to lie latent for considerable periods of time, the selection of sets from an infected locality is an undue risk which is not to be recommended. (The Midgenoo farmers should purchase their sets from the Lower Tully, which is apparently healthy.) (3) Resistant varieties; susceptible varieties are undesirable.

The H.Q. 426 in the district is probably all diseased. N.G. 15 is also susceptible but is difficult to replace. Infected farms could be replanted in part with Korpi or Q. 813 or H.Q. 409 or D. 1135. The farmers' secretary has a list of clean fields of these varieties.

Mr. R. W. Mungomery, Southern Assistant Entomologist, has submitted the following report (14th September) to the Director of Sugar Experiment Stations (Mr. H. T. Easterby):—

For the past month investigation work amongst cane pests has been followed out in the Bundaberg district, and, as was to be expected in the winter months, very little injury from these sources has taken place.

The Cane Moth Borer (*P. truncata*).

The most noticeable destruction has been that of the borer which has infested cane in some very "grassy" blocks adjacent to the Burnett River, and except for this the district could be said to be remarkably free from this pest. Two distinct phases of the attack of this insect can be seen in a field of H.Q. 285 which came under my notice this year. The first damage I noticed in March, when the bottoms of the cane sticks were bored and the larvæ at that time were on the point of pupating. When the insect attained its pupal and imaginal forms the cane had some chance of recuperating, and this is seen by a period of growth that ensued and is represented by the cane being quite sound and free from borer. At the present time caterpillars of the succeeding generation have established themselves in the top portion of the stick up as far as what is commonly termed the "cabbage," where they have evidently hibernated in this larval stage. Thus, one sees two centres of attack—the first at the base of the stick where the tunnels are old and black and often provide shelters for other insects, while the second is at the top of the cane stick, where the tunnels are fresh and quantities of frass are being ejected from them. Such goes to demonstrate the fact that some moths from the first generation have not gone far afield but have remained to reinfest the cane from which they emerged, and so one sees the difficulty of effectively getting rid of a pest like this when once it is given a footing in standing cane.

Cane Grubs (*P. furfuracea*).

A short time was spent in the Isis district for the purpose of carrying out observations on the cane grubs occurring there. It was found then, at the beginning of August when winter was at its height and light frosts were being experienced, grubs were actively feeding at the cane roots near the surface. These included both second and young third-stage grubs. Other and older third-stage grubs were encountered at depths from 15 to 21 inches, but these had their fatty products well developed and were in nicely fashioned pupal chambers, and there would most likely be a year's difference between their ages and those of the younger third-stage grubs.

Grubs of the second stage were found to be very erratic in their distribution, and were met with from 2 to 15 inches in depth, so that, although some authorities advocate fumigation in respect to certain trees, vines, &c., during the winter months when plant growth is checked and the cell sap not travelling freely, it could not be recommended for cane at this time, for many of the grubs would not come within its deadly influence and a low mortality would surely result.

Confirmation of the feeding of grubs during the winter months was established at the Southern Sugar Experiment Station, when second and third stage grubs were taken behind the plough in ploughing out an old block of cane immediately after the commencement of the crushing season. Though not to be had in large numbers these grubs were all within 10 inches of the surface, to which depth the disc was cutting, and they were usually found in amongst the old cane stools. So that from observations this year there appears to have been no true hibernating period in the case of the younger grubs, and the only semblance to such is a comparatively short quiescent period preceding the change from the second to the third instars, and this goes to show that there exist well-marked differences between the habits of the cockchafer grubs occurring in the Southern cane districts and those of the Northern fields.

Reverting once more to the Isis district, it will be of interest to note the condition of a farm there on which the above observations were made. One block of cane there was badly infested with grubs in January of this year, and at that time was carrying a crop of D. 1135 averaging about 10 tons per acre. This was left to stand over in the hopes of cutting a larger tonnage during this season, but now it is almost completely eaten out and only a few green sticks remain in isolated spots. Some grubs have been feeding there the whole time, and they have ultimately produced the same result as the well-known "greyback" grubs, though their devastation, unlike the "greybacks," has been one of "peaceful penetration" and the crop has gone down gradually, in marked contrast to the effect produced by the sudden onslaught of the Northern cane grub.

CANE PEST COMBAT AND CONTROL.

The Entomologist to the Bureau of Sugar Experiment Stations, Mr. Edmund Jarvis, has submitted the following report (21st September, 1926) to the Director, Mr. H. T. Easterby:—

Notes on the Tineid Moth-Borer.

An interesting occurrence of this small cane-pest, *Ephysteris chersaea* Meyr, was noticed at Redlynch, Freshwater, and Stratford on 26th August on four different selections, affecting collectively about 7 acres of young cane.

Most of the damage, as usual, was confined to shoots from 7 to 9 inches high, but in the present instance Mr. G. Bates, Assistant to Entomologist, noticed that cane 18 inches high had been destroyed. Infestation was observed both on alluvial sandy soils and high land of volcanic origin, the cane attacked being in all cases Badila.

This moth was first recorded by the writer as being injurious to cane in the year 1919 (see Bulletin No. 11 of this office), when it was observed to be causing "dead-hearts" in young ratoon crops at Pyramid, Gordonvale, Kamma, and Meringa. It usually bores second and third ratoon shoots, but up to the present has not been recorded from plant cane.

At Pyramid one could find large areas on which 30 to 50 per cent. of ratoons in affected stools had been killed by larvæ of *E. chersaea*. Outwardly, the damage corresponds in general appearance with that caused by our large noctuid borer *Phragmatiphila truncata* Walk., browning of the central or heart-leaves being a conspicuous and certain indication of such internal trouble.

The appearance of this pest in a locality so far removed from the Aloomba district seems worthy of special attention, since it affords evidence of the spread of an insect which may (as already stated in Bulletin No. 11, p. 7) prove of decided economic importance. Not being an indigenous species, but having, in the opinion of Dr. Guy A. K. Marshall, of the British Museum, "been probably introduced into Australia from Natal," it is quite possible that, in the absence of its own natural enemies and other controlling factors, this insect might, in a new country like Australia, increase abnormally and become troublesome in the near future.

Tenebrionid Larvæ in Cane Fields.

In almost any canefield the grower—if remaining perfectly still for two or three minutes, gazing intently at the soil between young cane rows or the surface of newly planted land—will usually become aware of the presence of a small, flattish, dusty-looking beetle about three-fourths of an inch in length, of elongate-oval form, crawling in an erratic, lively manner an inch or so, and then stopping a few moments and again scuttling about over the loose earth or lumps of soil. These beetles, two or more species of which are destructive at times to cane roots, belong to the genera *Opatrum* and *Gonocephalum*. The latter genus includes species of economic interest, *G. hoffmannseggii*, for instance, being destructive to potatoes and to roots of cereals in Mysore; while *Opatrum sabulosum* injures grape vines in the south of France by eating the buds on lower shoots and the terminal leaves.

Some years ago, at Pyramid, near Gordonvale, the writer noticed many small tenebrionid larvæ attacking roots of plant cane on a selection where beetles of *Opatrum* were very numerous.

Unfortunately, other work of more importance at the time prevented study of these larvæ or breeding them to the pupal and imago stages. At present, however, we are tracing the life-cycle of *Gonocephalum carpentariæ*, and have already obtained eggs of this species laid in moist soil in breeding-cages.

Control measures recommended against adults of *G. hoffmannseggii* are the application of poison-baits consisting of freshly chopped grass dipped in a solution of 1 lb. sodium arsenite and 8 lb. molasses, dissolved in 10 gallons of water.

Fresh weeds pulled up by the roots and spread along the rows an hour or two before sunset have also been found effective. Such grass-traps should be visited soon after nightfall and the beetles collected and destroyed. Control work of this nature is of little use unless carried out systematically.

Cane Grubs from South Queensland.

During the last few months, several specimens of the larvæ of *Pseudoholophylla furfuracea* Burm. and those of another melolonthid beetle have been obtained by us

from the Bundaberg and Childers districts through the courtesy of Mr. R. W. Mungomery, Assistant Entomologist. These grubs are of exceptional interest, and will be a valuable addition to our office collection of the scarabæidæ affecting sugarcane.

Apparently, *furfuracea*, which was reported by Mr. Mungomery to have caused serious damage last February in the Isis district, occupies a position in South Queensland somewhat similar in economic importance to that held by *Lepidiota frenchi* in the Northern portion.

It should be mentioned here that a scarabæid beetle described in Bulletin No. 16 of our Division of Entomology as being *Lepidiota grata* Blackb. is evidently not that species, and still awaits identification. Curiously enough, the specific name of our *Lepidiota*, which up to the present has been known as *Lepidiota* No. 215, has recently been determined by Mr. G. J. Arrow, of the British Museum, as *Lepidiota grata* Blackb.

This beetle is of local occurrence at Gordonvale, and, although often collected in the early days from furrows in canefields, cannot at present be considered a very injurious species.

Cane-Beetles in Pupal Cells.

Examination of the pupal cells below some grub-infested stools on red volcanic high land soil at Meringa on 21st August revealed pupæ and greyback beetles in about equal proportions, some of the latter having effected transformation to the imago condition a week or so prior to our investigation, while others with softer elytra had probably not spent more than a couple of days in the beetle state. Pupation had taken place late in June at an average depth of 14 inches, indicating that the soil at that time contained less moisture than usual, the average depth of these pupal chambers in such land in normal seasons being about 12 inches.

During their strange subterranean existence, while the chitinous integument of the exoskeleton gradually attains rigidity, profound changes may possibly take place among various internal organs; until after a lapse of about three weeks, when fully endued at last with suppressed activity, these prisoners in the dark await with eagerness the call of the rain from above.

If pupation should chance to be followed by a dry spell lasting throughout November and December, such conditions will probably operate as a severe check to its increase, and millions of these expectant beetles will never see the light of day.

In the beetle season of 1923 the rainfall during the months of October, November, and December was 6.68 inches, as against 15.27 inches—which is the usual average for this period.

During the following season, 1924, however, the precipitation was 3 inches above this average, which gave the beetles a chance to make up for the setback of the preceding period.

Fortunately, in the season just over (1925) the rainfall during the above-mentioned three months happened again to fall to 6.09 inches, a decrease of 9.18 inches below the average, with the result that the numerical increase of our notorious cane-beetle once more received a decided check.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Occurrence of Tineid Moth-Borer.

In view of its possible spread into other districts than those already recorded, we should be glad if canegrowers chancing to notice evidence of the presence of this insect amongst their ratoons would advise the Entomologist at Meringa Experiment Station.

Watch for Appearance of Greybacks.

Beetles may make an early emergence this season in localities where their grubs pupated towards the end of June or early in July.

During 1917 these cockchafer commenced flying on 29th October, and in 1918 a primary emergence was recorded on 15th October. Eminently favourable seasons for controlling cane grubs by means of soil fumigation are those in which emergence of the beetles takes place in October or the beginning of November, while much of the cane is still small and the ground free from excessive moisture.

To be on the safe side it is well to commence the work of injecting on cane land known from past experience to be invariably grub-infested, about three weeks after first observing greybacks on the wing. This advice applies more particularly to seasons in which emergence occurs during December; appearance of the beetles in October or early in November, allowing of course a longer period for carrying out fumigation work before commencement of the wet season.

How Growers can Fight the Beetle Borer.

1. Burn the trash in canefields where Tachinid flies have *not* been liberated.
2. Strip the trash on areas where the Tachinid parasite has been introduced or is working in affected sticks.
3. Lay bait-traps consisting of pieces of split cane about 18 inches long placed in heaps of from fifteen to twenty pieces in concavities about 5 inches deep excavated in headlands, and covered over lightly with trash or debris to prevent the cane from drying too quickly. Visit these traps every other day to collect and destroy weevil-borers attracted to same.
4. Select clean seed cane, free from indication of borer tunnels.
5. Obtain Tachinid fly parasites from the Sugar Bureau, by applying to the Entomologist, Meringa Experiment Station.

Entomological Canegrowers.

More interest could with advantage be shown by our growers in practical nature study relating to the economy of various insects occurring in canefields.

When unable to tell friends from foes in the insect world, many useful parasitic or predaceous enemies of cane grubs and other pests run a risk of being mistaken for injurious species and promptly destroyed.

When uncertain of the habits of any insects frequently seen in canefields the grower should drop same into a bottle containing methylated spirits and water (half and half) and send it to the Entomologist at Meringa for identification and advice.

Growers should also call at the Laboratory and have a look at our Museum which contains specimens of all insects known to attack cane in North Queensland, together with their principal enemies.

FIELD REPORTS.

The Northern Field Assistant, Mr. A. P. Gibson, reports (9th September, 1926):—

Unclouded skies to the 24th August, when heavy showers commenced to fall.

The year's rainfall to date is far below the usual. The Tully had recorded 65.87 points and Babinda 92.71 points.

Progress.

The growth of the Tully township continues. The town is lighted by electricity generated at the mill. Unfortunately the streets are narrow.

The Tully crop generally had improved since my last inspection, more especially that raised east of the mill. High and low tonnages are common in paddocks; such alternating conditions are due obviously to a poor strike and most erratic make-up of the soil. Early Tully and El Arish estimates may be exceeded, but that of Silkwood is likely to be reduced. A high percentage of the crop to cut is plant. Lengthy dry stretches had impeded the crop growth.

Harvesting.

The dry period since cutting commenced has permitted continuous working in field and mill; in consequence marvellous progress has been made in removing the 1926 crop. Exceptionally high ground cutting and much solid cane has been left on the top in parts at Tully. Weight of cane and sugar is lost, and subsequent ratoons are damaged, unless the highly cut cane is early removed. A sharp, heavy hoe, or, better still, an adze serves this purpose well.

The mill at Tully is working moderately well; it had not crushed its possible weekly tonnage.

Cultivation.

Comparatively few farmers at Tully have ploughable land; generally the soil is shallow. Great injury may be occasioned by ploughing too deep; this operation should be regulated by the depth of the surface soil. Soil washing may be arrested on abrupt hillside farms by leaving the trash after harvesting. Timber burning adjacent to maturing cane paddocks is often the origin of disastrous cane fires, and losses could be avoided by exercising more caution after burning off. Great stumpy areas are being cleared prior to ploughing. The use of explosives is assisting in lightening and cheapening this class of work. Horses are quickly changing to tractors, and feed to liquid fuel. The rotary cultivator is becoming popular, and is used on the more friable soils. When this is used prior to ploughing out the old crop, it should shatter and more finely divide the old stubble and permit its speedy disintegration, also ensuring its killing, thereby destroying the medium by which diseases are sometimes carried on to the subsequent crop. The average depth of ploughing in this district is about 9 inches.

Babinda.

The railroad from Bucklands to what is known as 67 Branch has been connected. This is a judicious move and one of double importance, for, should one of the two bridges now spanning the Babinda Creek be damaged or carried away whilst crushing is in progress, there would remain another avenue along which the crop could be removed to the factory.

The Crop.—The prevailing mid-year's dry weather, following on unusually low early rainfall, transformed what had every appearance of being a record district harvest to one of moderate degree.

In 1914 Babinda mill and its solid little town were not on the map. Its cane area extends all the way back on either side of the North Coast railroad from Fishery Creek to the southern bank of the picturesque Russell River. In the tributary district are mountains of great height and much land of high quality. The mill had treated nearly half of its very fine crop. Generally the cane had a fine colour; the semi-dry conditions had slowed down the growth and enabled it to fully mature. Never before have such excellent sugar contents been known in the area. The crop is cutting to expectations, although the yield per acre is likely to be less than that of former years. The recent rainfall, if backed by warmer conditions, should speed up the growth of the late-cut and backward paddocks and ensure their cutting.

Erosion of River Banks.—This is mainly brought about by the injudicious practice of removing the trees and undergrowth from the banks of speedy-running and winding streams. At Babinda the loss of soil is great on some of the creek farms.

Planting.—The following notes on scrub planting may be of use to new growers, some of whom appear to have hazy ideas regarding this highly important work, and in consequence have paid dearly for their experience:—

1. When logging, clear 9-foot tramway tracks every 2 chains.
2. Cane Holing.—Of the many implements used, the spade is about the best. Make cane drills 5 feet and cane holes from 2 feet 9 inches to 3 feet apart. Too close planting in virgin scrub land is not recommended.
3. Important. Use only disease-free and vigorously growing cane for plants. Keep knives sharp and avoid too much immature top.
4. One good set in a hole is enough. Cover plants with some 2 inches of pulverised soil, and do not entirely fill up the hole; this may be done later when the stool has become established. Given favourable conditions, the primary shoot should be bursting through the soil in about nine days.
5. Control the weeds on headlands and fields from the start. A poison solution sprayed on the early weed growth is cheap and effective, and is not harmful to the soil provided it is used in moderation.

Planters at Babinda expect a good price for 1927; in consequence much cane harvested this year has been ploughed out and immediately replanted. There is not much autumn plant. August is generally more seasonable; therefore most of the planting is done this month. Badila plant is not at its best under fourteen months old, therefore much August planting has the tendency of making the crop late.

Pests.—Cane grubs, weevil borer, wallabies, army worms, and white ants were noted. Grubs are sometimes credited with damaging cane when other causes have been responsible; however, grubs had occasioned much damage to cane growing on the Merriwinni rangeside friable decomposed granite areas. It is thought that beetles

are gifted with a certain amount of homing instinct, or that the soil frequently carries an odour which the beetles on flight detect, hence the probable reason why they return to similar places. The weevil borer is hardly noticeable at the Tully, but found working strongly on several Babinda farms. Beetles were picked up along the line soon after a cane train had passed; evidently this is one of the many ways by which they are conveyed to new areas. Although the Tully area is free from the pest at present, it is quite possible that beetles may be liberated from standing and affected cane in the mill yard and which has been transported from distant areas. Wallabies and army worms are retarding the growth of young cane in patches; the former is generally more troublesome in dry times. The latter may be controlled by clean headlands and the use of poison baits or sprays.

White ants generally destroy a small percentage of sets, and have been known to completely demolish the stubble of ratoons. When this is so the patch should be replanted.

Diseases.—Leaf Scald is still increasing steadily at Tully and Babinda. The varieties mostly troubled are H.Q. 426 and Goru family. Wherever possible the farmers are shown this disease. Areas known to have been planted from diseased fields continue to die. Top Rot is very prevalent in parts at the Tully and Babinda.

El Arish reported a disease showing up on the leaves of big and small cane. The writer attributed such markings to the then cold weather conditions.

Our Feathery Friends.—The good old ibis is a protected bird; its beneficial work is not appreciated to the extent that it deserves.

The Babinda Mill.—Babinda mill had crushed 1,495,137 tons since its inception. Two hundred and fourteen growers supplied 164,238 tons of cane last year, as follows:—

Area harvested (1925), 8,769 acres; cane crushed, 164,238 tons; cane condemned, 694 tons; yield per acre, 18.7 tons; sugar per acre, 2.5 tons; sugar manufactured, 22,430 tons.

The variety percentage of crop harvested, together with its respective average c.e.s., is as follows:—

Variety.	Per cent. total crop.	Average c.e.s.
Badila (N.G. 15)	90.56	14.098
Goru	3.88	13.878
H.Q. 426	2.48	14.166
D. 1135	1.04	13.615
Q. 813	0.57	13.729
Other varieties	1.47	14.053

It will be seen that H.Q. 426 variety, like Mossman and Mulgrave, had yielded a higher c.e.s. This is hardly a fair criterion to go by, because of the fact that Badila variety is mainly grown, and in consequence is harvested early and late.

Unusual tops were observed on Badila, D. 1135, and the Goru family. Big leaves were absent; instead were many bunched, blade-grass-like leaves, which opened fan-shaped; such tops, examined, revealed a contorted, rather hard growing point. No insect injury could be found. The cause may be occasioned by climatic conditions or a check whilst arrowing.

Manuring.—Very little was being applied. At Tully 30 cwt. of lime had been broadcasted over an area. This should be lightly worked into the soil by plough or harrows.

The Central Field Assistant, Mr. E. H. Osborn, reports (17th September, 1926):—

Dry conditions had been experienced generally, the rainfall amounting to only 18.81 inches to date. However, steady soaking rain has now set in. Severe frosts also caused loss among the crops in low-lying and more exposed portions of the area.

In the town of Mackay many new and substantial business premises have been erected recently, and much needed attention has been paid to the local roads; telephonic installation is being extended considerably in the outside areas.

Homebush and Oakenden.

Very little cane had been cut from this area, except badly frosted and cane accidentally burnt, which was being sent to Marian, Pleystowe, Racecourse, and North Eton mills, as Farleigh mill was not then operating.

Accidental cane fires were responsible for serious losses to two Homebush growers, one grower having some 200 tons of standover condemned. In this area the writer was surprised to see how well the cane looked, large blocks of plant and ratoons comparing very favourably with any seen elsewhere. The depth of soil is mostly shallow. Luckily, however, it is blessed with a clayey subsoil which retains the moisture, quite distinct from the Oakenden soil, which, resting upon a shingly subsoil, requires far more moisture.

After at least three ploughings (generally many more), Bumper discs are used to make the 9-ft. beds with water furrow between each, and then machine-planted right away, or else the planter follows skeleton ploughing of the drill. In either case there are no open drills letting moisture away. When the results of this method of cultivation are seen, its success seems assured.

First ratoons of H.Q. 426, Malagache, Q. 813, 7 R. 428, and M. 1900 on several of the typical well-cultivated farms looked marvellously well. Fertilisers are in general use, and green manure in a suitable season, while trash is also ploughed in on many farms.

Oakenden.

This area was having a very bad time, with patches of cane drying right out. Young cane was only being kept alive by continuous cultivation, and it was wonderful to see how well some paddocks looked. Frost had done damage in places, which was accentuated by the late starting of Farleigh mill, and consequential delay in harvesting such crops.

Farleigh.

Cane was still keeping fairly green, blocks of M. 1900, Q. 813, N.G. 15, E.K. 28, E.K. 1, and Malagache all standing well up to it. Much work was being put into the young cane, and some planting was still in progress.

Much standover was noticed, a fair proportion of which had deteriorated badly. Among the standover was a very fine crop of Badila (N.G. 15) on Mr. H. G. Matthews's farm.

Racecourse.

Practically similar conditions prevailed here, except that the local mill was in full swing and getting away with its crop in good style, the only delay being through the very poor quality of some of the S.O. cane coming in, causing trouble in manufacturing.

Flaggy Rock.

This busy little sub-district seems to have had more rain than others, and also to have been free from frost; consequently some very fair cane—mostly M. 1900 and Q. 813—was evident. The principal grower, Mr. Horace Hill, is harvesting some 60 odd acres this year, with probably another 20 for next season. Most of the farms are near the railway.

Carmila.

This place has had more than its share of frost, but the Plane Creek mill management is doing its best to minimise loss. Some really good Badilla was seen; third ratoons cutting up to 20 tons per acre were being taken off Mr. W. Staier's holding, showing that the land is all right.

Koumala.

This region has progressed rapidly during the past few years, and now possesses one of the prettiest railway stations in the North with its wealth of ferns and orchids. It also has three stores—butcher, baker, and smith's shops. Cane is derricked at the railway for Plane Creek, after having been hauled over a 2-ft. tramline with two branches of about 2 and 6 miles respectively. In general, the cane here looked greener than elsewhere, and cattle and horses were in fair condition. Very little frost had been experienced. Some good cane was being cut, a crop of third ratoon M. 1900 from Mr. S. A. Lillendal's yielding about 20 tons per acre in this dry year, and this on only medium land, careful and thorough cultivation on a small area being responsible for this.

Varieties.—Q. 813 is probably the most popular cane for poor or medium land (except where grubs are prevalent), and stands up exceedingly well to dry conditions. E.K. 28 is also becoming more popular, and also stands up to dry conditions. E.K. 1,

in several isolated places, looked well. Malagache and D.1135 are also fair dry-weather canes. M.1900 and H.Q. 426, although growing well and carrying good c.c.s., won't stand up to either dry or frost conditions too well. H.Q. 285, although an early maturer and sweet cane, is not too good in a dry time. Innis is very patchy and is worth watching on account of disease. Badila (N.G. 15), with suitable soil conditions, is still a first-class cane. N.G. 103 has given good plant and first ratoons at Farleigh, and its second ratoons are still fair, carrying a good density in each crop. D.1457 is credited with good tonnage and density for plant and first ratoon upon one Sarina farm, growing upon a medium alluvial soil.

Pests.—Grubs, helped by dry weather, are responsible for much damage this year. Mount Jukes suffered so heavily that several paddocks must be ploughed out. One paddock, abandoned several years ago from this cause, was planted two years ago. The plant crop showed many grubs, but not nearly as bad as this year's first ratoons. The nature of the soil, mostly friable chocolate, and the quantity of timber on the surrounding and close-by hills, makes it a place where grubs can do a lot of damage. D.1135, E.K. 28, Uba, H.Q. 426, 7 R. 428, all had suffered, the first two varieties about the least.

Borers were also responsible for much damage to 7 R. 428 (Pompey) here, many sticks being absolutely riddled with them, the pest in its grub and beetle stage being found in most sticks.

Wallabies were also causing much damage in places, especially at Oakenden, wire-netting proving of little avail when there is no grass and the animals are desperately hungry.

Opossums.—Damage was caused by these in many blocks of cane where trees were near. At Koumala, H.Q. 285 and Q. 813 were growing side by side with several near-by dead trees; great damage was done to the first-named cane, with none to the Q. 813.

Wire worms did a little damage to early planted cane in low-lying parts.

Diseases.—Red Rot was showing up slightly in M.1900, while Foot Rot in Innes was seen in the Farleigh area. Knife-cut in D.1135 was fairly common in Oakenden. Mosaic was seen in a green cane at Koumala, and in E.K. 28 at Mount Jukes, but only in a few stools.

The Southern Field Assistant (Mr. J. C. Murray) reports (20th September, 1926):—

Maryborough.

Continued dry weather has seriously affected cane in this district, especially on the more elevated farms. The flats along the Mary are showing fair cane, no doubt due to greater capillary action. Capillarity is the water rising from the lower stratas of soil to the top soil, and can often be caused by deep cultivation and under drainage.

The red volcanic soils that occur in the Maryborough district should give better results. There are some very rich red soil areas between Maryborough and Magnolia, and if the farmers working them would give exclusive attention to 30 acres each they should do well. One man by himself cannot do justice to more than 20 acres of cultivation—that is, if he does it properly. In farming 30 acres, the grower could work on what might be called a 25 per cent. basis—that is, have 10 acres always undergoing rotation, fallowing, green manuring, or other treatment conducive to soil restoration. Ploughing and planting are the least exacting of operations involved, the subsequent cultivation requiring many months of careful and constant work. The lack of this is the great weakness in Queensland cane farming generally.

In the subsequent cultivation of young plant cane the plough should never be used, because it works from 6 to 8 inches deep, inverting the soil and disturbing ferments and processes in the soils and placing plant food beyond the reach of the young crop just where it wants it. A light cultivator which stirs to a shallow depth, but does not invert, is the correct implement to use. The disc cultivator should not be used after the cane is two months old.

Growers are recommended to discard Meerah, Striped Singapore, and Rappoe. The best varieties for this district are M.1900 Seedling, H.Q. 285, E.K. 28, and Q. 813. The canes recommended to be discarded are very susceptible to disease, particularly gumming.

The following may be of interest, as showing the available plant foods in the red soil, soluble in 1 per cent. aspartic acid:—

			Per cent.		lb. per acre.
Phosphoric acid	..	..	.. .0006	..	18
Lime	..	..	.. .0946	..	2,838
Potash	..	..	.. .0233	..	699

It will be observed from this table that the phosphoric acid is very low.

A typical red volcanic soil taken from Woongarra, Bundaberg, contains 819 lb. of available potash per acre and 42 lb. of available phosphoric acid.

Yerra.

The cane on the whole appeared to be satisfactory, considering the long spell of dry weather that it has been through. Pasture is dry, although stock is in fair condition. Much land may still be farmed in this district. Farmers are requested to keep in touch with the Bureau in connection with matters relating to soil analysis and variety propagation. It is probable that this district will in future serve a twofold purpose of supplying fodder cane to the Burnett stock areas and sugar-cane to the mill.

Pialba.

There is some very fair cane to be seen, particularly the Q. 813, a variety gaining in popularity. Hambledon Seedling 285 is also being more accepted. The district generally is making good progress, and although the dry spell has hit the farmers this year, Pialba may become one of our more important rural regions, though cane will probably remain the staple product. A good road is badly wanted from Maryborough.

The tractor is coming more into use. The rotary cultivator is being used also, and it is the consensus of opinion among canegrowers that this is the best implement they have had for some time. Growers are unwise, though, to use this implement without a respirator of some kind, especially in the red soil, as the dust is always considerable.

Childers.

This district has suffered greatly from drought—the worst in the writer's experience. The prospect for next year, however, is not unpromising if rains occur within the next six weeks, as the young plant cane is showing fairly well. The great problem confronting the farmers here is how to maintain a continuous, if not large, supply of cane to their mill. The important thing for farmers to concentrate on is soil improvement by more intensive cultivation, combined with sub-surface drains. There are very few growers in the Isis that work on the system of methodically placing a definite percentage of their farms on the fallowing list, and also very few who have effective under drains—two most important factors in dry belts. Cane farmers of Southern Queensland, not only in Childers, are earnestly recommended to rest and renew their farms by throwing one-fourth of their holdings out of cane each year, otherwise the time is not far distant when the land will be so exhausted that only the poorest crops, very susceptible to disease and parasite attacks, will result.

Dallarnil.

Light rains have recently freshened up this district, but have done no good to the existing crop. Cutting is in full swing, and much depends on this year's returns how the farmers look at the industry. A good c.e.s. return and spring rains may place a different complexion on affairs.

QUEENSLAND SHOW DATES, 1926.

Nundah: 1st and 2nd October.

Balmoral: 16th October.

Kenilworth: 7th October.

Brookfield: 23rd October.

Southport: 9th October.

Mount Gravatt: 30th October.

Enoggera: 9th October.

AGRICULTURE IN QUEENSLAND.

By H. C. QUODLING, Director of Agriculture.*

The 1925-1926 Season.

Within the borders of such a vast State as Queensland it is only to be expected that marked differences would be noted in the class and character of the seasons experienced from year to year. Unfortunately, certain pastoral areas suffered for many months from the effects of insufficient rainfall. (Widespread beneficial rains, from one to over four inches, have since been recorded over practically the whole of Queensland.—Ed.) In some of the agricultural districts in the Southern portion of the State dry conditions also prevailed. A few provident farmers who conserved hay and ensilage maintained their stock satisfactorily, but many had to move every hoof to agistment country. The immediate North Coast district enjoyed a good season, while in the Mary Valley and parts of the Stanley and Upper Brisbane River districts fairly satisfactory rains were recorded. A rather prolonged dry spell, however, occurred in the Maranoa, Darling Downs, West Moreton, South Coast, and Kingaroy districts, and was the direct cause of a lessened production of dairy and agricultural produce of all kinds.

In Central Queensland beneficial rains in the winter of last year were followed by light but useful rains in the spring, which permitted of the preparation and planting of appreciable areas of maize and cotton. Summer rains, however, proved scanty.

North Queensland, particularly the Atherton Tableland, enjoyed a splendid summer season, and the maize crop promises to be a record one. Other districts, outside of the favoured tropical belt of country, particularly those west and south of Townsville, suffered through lack of sufficient rain.

Hay and Fodder Conservation.

Brief as the reference was under the previous heading to the spell of dry weather, which was felt in quite a number of important agricultural districts, its incidence and probable recurrence cannot very well be ignored. Although interest has latterly been shown in silo construction, the greater perhaps being in the Dawson Valley, where several reinforced concrete silos were recently built, it is only too evident that the Queensland stockowner will have to be more provident in the future, both in the matter of hay and ensilage conservation. Hay sheds, to avoid the extraordinary waste due to stacking hay in the open; and silos, to conserve the thousands of tons of maize plants rendered valueless, as they were this year, for grain production through spells of dry weather, require to be made more familiar land marks than they are to-day.

If it were possible for each stockowner to hold reserves of fodder on his property (and this is applicable also to the grazier, who in the generality of cases has superabundant supplies of natural grasses available in good seasons) a dry spell would be robbed of its disastrous aftermath, a safer living assured, and the live stock, a national asset, not only saved but kept in a state of production.

Although liberal provision has been made under the Agricultural Bank Act for the erection of hay sheds and silos and the purchase of plant for harvesting and conserving fodder, the would-be borrower is brought face to face with difficulties. Obviously, where the security is sound, he must have some easier means of getting money than at present. And if this latter object were more readily attainable, other matters, in the way of construction of suitable buildings and the use of portable plant, could be provided for on a much more advantageous basis.

A brief survey of some of the more important crops and of departmental activities in connection therewith is as follows:—

Wheat.

The 1925 crop, the marketing of which under the Wheat Pool Act is directly in the hands of the growers' representatives, gave an aggregate return, exclusive of seed and feed requirements on farms, of 1,799,263 bushels of grain, which was delivered to the Board. In certain districts, notably Maranoa and Inglewood, yields

* In the Annual Report of the Department of Agriculture and Stock, 1925-26.

were irregular; and in some instances, on the heavier soils of the Maranoa, seed failed to germinate, with the result that odd failures occurred. On the Darling Downs, where the major part of the wheat is produced, the average yield was reduced by two circumstances—insufficient rain, principally on a belt of country near Nobby and Clifton; and, secondly, by two late frosts in September, which affected the wheat belt generally and caught Florence and Pusa largely, two frost-susceptible but popular varieties, whose early-maturing characteristics had accounted for the crops being in a forward and rather susceptible condition (the flowering stage) when the frosts occurred. Wheats of later maturing habit more or less escaped, and it is reasonable to infer that in frost-labile situations the tendency will be to choose less susceptible varieties, or sow as late as possible consistent with local conditions.

Turning away from these disabilities and risks which the farmer is up against by the nature of his calling, the other and more pleasing prospect is presented. On hillside and slope of the picturesque Darling Downs the vista presented itself at harvest time of field after field of superb crops yielding in the main from seven to eight bags of grain to the acre, and on occasions ten and twelve and even up to fourteen and fifteen bags.

With anything like satisfactory conditions for production, the possibilities of expansion of the wheat industry are most encouraging. Expansion undoubtedly means much to the State.

How the Department is Assisting to Stabilise the Industry.

Experience has proved how important it is to produce varieties suitable to the conditions under which they are to be grown. To meet requirements here, the department has carried on wheat-breeding work consistently for a long term of years at the Roma State Farm. Wheats with improved field characteristics, including rust resistance, have been bred to meet special requirements in different districts, and the co-ordination of effort between the wheat-breeder and the Departmental Field Staff has been the means of bringing several promising varieties into general cultivation. With the object of making this work more fully effective and of the greatest possible benefit to the individual grower, a conference was held, before the 1926 planting season commenced, between officers of the Department and the Wheat Board, when a far-reaching scheme was brought forward by the Department and approved of by the Board. This included the raising each year, under agreement between the individual grower and the Board, of supplies of pure seed for delivery to the Board under the premium system and its cleaning and grading at suitable district centres, whence it would be distributed as required. Between thirty and forty growers were supplied with pure Departmental seed. Additionally, the Board is assisting the Department in its effort to eliminate smut (bunt) from Queensland-grown wheat in an endeavour to have all seed wheat pickled with copper carbonate before it is sown.

1926 Wheat Season.

This year it is expected that the area cropped will constitute a record, the price for last season's wheat (slightly over 6s. per bushel should be realised) acting as an inducement to growers to prepare as much land as possible. The Maranoa district had better rain than elsewhere throughout the main Darling Downs wheat belt. Generally speaking the rains over the latter stretch of country were light; the first fall, which was a few weeks late for the seasonable sowing of slow-maturing wheats like Currawa and Cleveland, came just in time for the general planting of mid-season varieties, and a second fall, a week or two later, permitted sowing generally. Those who had prepared land early and kept it in good tilth obtained a very satisfactory germination. In a few localities, particularly on heavy black-soil country that was at all late in being worked, the rain was barely in sufficient quantity to permit of the preparation of a good seed bed. Here the soil was inclined to remain in coarse nodules, and on this account some of the seed wheat malted and had to be resown.

In a number of localities on the Darling Downs sufficient rain fell to moisten both soil and subsoil, and here the crops are doing well and will carry on for some time. Elsewhere the rain only penetrated about six inches, and although the young wheat got away nicely (there was some damage on flat country by heavy frosts to embryo plants of low vitality) good soaking rains are urgently needed to thoroughly establish and carry on the young crops.

The Departmental wheat programme for the season is a continuation of tests in progress, with the object of evolving improved types of wheat for Queensland

conditions and for the propagation of special strains of seed. The wheat-breeding work at Roma State Farm has also been designed on an extensive scale this season.

Maize.

The high prices realised this year, with the certain prospect of an advance, were due in the first place to a reduction in the aggregate yield of the 1925-26 crop and concurrently to the extraordinary demand for grain as sheep food in the dry pastoral areas.

In the Southern division of the State, with the exception of the Mary Valley and the Upper Brisbane River districts, where more rain fell and good crops resulted, all the other big maize-growing centres in the Southern Burnett, South Coast, West Moreton, Lockyer, and Downs districts were not favoured with sufficient rain to ensure even a good average return. Generally speaking, the early and late planted areas yielded light crops, but the main planting more or less failed. In contrast to the partial failure in the Southern and Central divisions, the Northern maize-growing area on the Atherton Tableland enjoyed one of the most favourable seasons possible. Here the yield promises to exceed 20,000 tons, and on account of the nature of the season (freedom from an excess of drizzling rains) the quality of the grain will be good.

Seed Maize Improvement.

The type and quality of the stud seed maize produced this year by the efforts of the departmental officer (Mr. McKeon), who is specialising on seed maize improvement, is remarkable for its evenness and uniformity; and it is questionable whether better grain of the respective varieties undergoing improvement could be found. Such a result is only possible by years of careful technical work, which in such an important maize-growing country as this is should have a far-reaching beneficial effect.

Establishment of a Stud Maize-Breeding and Research Farm.

The work of the Department has now been brought to a stage when very considerable assistance would be derived by the establishment of a specialised Stud Breeding and Research Farm, where problems intimately connected with the progress and development of the maize-growing industry could be investigated.

Additional work was designed and is in progress to evolve a type of grain to suit Atherton Tableland conditions, where difficulty has been experienced in past wet seasons with the locally-grown type of maize, which produces a rather soft grain, somewhat susceptible to moulds.

Maize Harvesting Machines.

Reference was made last year to the excellent work witnessed at a trial on the Downs of a Toowoomba manufactured maize reaper-thresher. The Northern Instructor in Agriculture in his annual report has referred to another machine designed for harvesting maize which was imported by Messrs. Faichney Bros., of Kairi. Obviously, the perfecting of a machine for harvesting and threshing maize is a matter of very great importance in the development of the industry.

Malting Barley.

Limited areas only were cropped last year on the Darling Downs, the market evidently being restricted by the capacity of the two Toowoomba malt houses to absorb the output; and to some extent also by the competition by Southern-grown barley. The crops generally were somewhat short, but the yields were fair and in some cases good.

Canary Seed.

Although a more co-ordinated system of handling and marketing was instituted under the existing Canary Seed Pool, the 1925 crop was not up to expectations, due to the fact that the belt of country in the Nobby and Clifton districts, which ordinarily produces the major part of the Queensland crop, suffered from the dry spell. Canary seed crops consequently did not stool out and develop satisfactorily, and light yields were all too common. The plant does much better in seasons when there are ample supplies of soil moisture.

Peanuts.

Interesting and important developments have taken place at Kingaroy in connection with the peanut growing industry. Here the peanut plant finds a congenial home on the rich red volcanic, friable loams of the district. Last year, with the assistance of the Department, a peanut-shelling machine was secured and installed by the Peanut Pool Board, whose centre of operations is at Kingaroy. Prior to this the marketing of the crop was done on the shell, and although the grower got a fair return, the profit went elsewhere. The installation of the machine was the "open sesame" to the Australian market, and full advantage is being taken by the enterprising secretary and members of the Board to popularise their shelled peanuts. In the season 1924-25 691 acres were cropped throughout the State. In the present season, 1925-26, it is estimated that 3,000 acres were cropped in the Kingaroy district alone, and present indications point to the probability of placing 10,000 acres under peanuts this season in the same locality. An electrically-driven cleaning, grading, and shelling plant has been put in at a cost of about £1,500, and the sheller will turn out a ton of shelled peanuts per hour.

The crop this season was reduced through the incidence of the dry weather, but owing to the deep-rooting nature of the plant it gave a return under weather conditions which proved disastrous to maize. Reference to seven years' statistics of the peanut crop shows the average return, in the shell, to be 1,141 lb. per acre.

Tobacco.

The industry is not progressing. As a matter of fact, this applies to both pipe and cigar leaf.

The centre of operations of the former class of tobacco is at Texas and the latter at Bowen. With few exceptions, pipe leaf is grown on the share system by Chinese.

Flue curing to produce the quality and colour required by manufacturers was given a trial on Texas Station, but the slightly increased price did not leave a sufficient margin of profit at the time between it and the ordinary air-dried leaf to warrant a continuation of the process.

The limited tonnage produced is still air-dried, and the tendency on the part of the Chinese is to grow heavy-yielding types in preference to varieties which may not in the generality of cases produce quite such heavy crops.

Another difficulty which militates against the progress of the industry is the lack of competition in buying, marketing having to be effected principally through the British-Australian Tobacco Company, which has a monopoly in manufacturing.

The cigar leaf growing industry is also in a parlous condition, growers also having had difficulty in obtaining payable prices through Melbourne brokers who deal direct with cigar manufacturers. Inquiries made by the Department on behalf of growers showed that the principal reason for this was attributable to faulty curing and marketing the leaf in an immature condition.

The Department makes a practice of regularly importing choice kinds of pipe and cigar leaf seed for use of growers. There appears to be a promising field for work by an instructor in tobacco culture with a knowledge of both growing and curing.

Renovation of Paspalum Pastures.

Four sets of experiments at Atherton, Cooroy, Maleny, and Runcorn are in progress—sixteen plots each at the three first-mentioned and forty plots at the latter centres. In all cases comparisons are being made between ploughed and unploughed, and fertilised and unfertilised plots respectively.

In the progress report submitted by the Assistant Instructor in Agriculture, Mr. C. S. Clydesdale, interesting data are given respecting the green tonnage weights cut from special areas enclosed for this purpose. Taking the lowest and the highest yielding plots merely as an example, it is shown that Plot 1A, unmanured and *unploughed*, gave an aggregate green tonnage weight of 4.58 tons per acre, equal to a growth of 31 lb. of grass daily per acre over a period of 326 days, 15th June, 1925, to 22nd April, 1926, in which seven cuttings were made. Plot 8B, unmanured and *ploughed*, with a corresponding return of 16.31 tons and 112 lb. of grass grown daily per acre, a gain effected by ploughing of 81 lb. of grass daily, approximately a ratio in favour of ploughing of four to one.

No more convincing proof could be had of the effectiveness of this method of resuscitating old paspalum lands, nor of improving their stock-carrying capacity. It also opens up great possibilities in the matter of renovating and improving the stock-carrying and milk-producing capacities of paspalum country, by the introduction of protein-yielding plants such as clovers and lucerne, which could more readily be established on inverted sod land before the renewed growth of paspalum is made.

The possibilities opened up by this experiment are very great indeed, and serve to illustrate that the rich tract of volcanic country of which Maleny is the centre may readily be brought back to its original stocking-carrying capacity, which was a beast to the acre.

Agricultural Instruction and Departmental Experimental Plot Work.

A fairly comprehensive scheme of crop and fertiliser experiments was designed and carried out in the Northern, Central, and Southern divisions of the State, details of which are furnished in the reports of Messrs. Pollock, Brooks, and Gibson, Instructors in Agriculture for the respective divisions.

Good work is being done by the whole of the members of the Field Staff. The duties of the instructors are of a varied nature. By coming into personal touch with the farmers the instructors are brought face to face with the problems confronting them. It affords an opportunity also of introducing and testing new varieties of crops of economic value and of imparting advice on cultivation and soil treatment; on methods of fodder conservation; how to recognise and treat the more common plant pests and diseases, and on agricultural matters generally, all of which exercise an important bearing on production.

Instructors in Pig and Poultry Raising.

The services of both these officers, Messrs. Shelton and Rumball, have been largely availed of by farmers interested in the respective callings, and a perusal of the reports submitted will indicate the character and scope of work each was actively engaged in, which is undoubtedly exercising a very important influence in the industries concerned.

Advertising the Agricultural Resources of the State.

A comprehensive exhibit was prepared and despatched to the New Zealand and South Seas Exhibition at Dunedin, where the Queensland exhibits excited much favourable comment. Nothing but good should result from such a splendid opportunity of advertising the resources of the State.

A very complete exhibit was also prepared and displayed at the Royal National Show in Brisbane.

The preparation of two complete exhibits of this character entailed a great deal of organisation and of resourceful work on the part of officers of my branch, to whom much credit is due.

State Clydesdale Stallions.

Four stallions—General Wallace, Bold Wyllie, Premier Again, and Glenalla—were allocated to the Laidley, Murgon, Cunningham, and Crow's Nest districts, where seventy-four, fifty-five, seventy, and fifty-seven mares were respectively served, making a total of 256 for the season.

In addition to mares previously examined and passed, a veterinary examination for soundness and for type and conformation was made in the undermentioned districts, but the number of mares brought forward proved insufficient to warrant the placing of a stallion in any locality. A comparison between the number respectively examined and passed will serve to indicate that the quality and type of animals in the neighbourhood of Mackay and Rockhampton did not conform to the desired standard:—

District.			Examined.	Inspections.			Passed.
Lowood	..	..	77	..	2	..	38
Clifton	..	..	38	..	2	..	25
Bundaberg	..	..	13	..	1	..	9
Mackay	..	..	8	..	1	..	0
Rockhampton	..	..	11	..	1	..	1

BUNCHY TOP—DEPARTMENTAL ACTION.

In order that the banana-growers of Queensland may fully realise the seriousness of the position of the banana industry created by the spread of Bunchy Top, which is now known to be present in several areas in Southern Coastal Queensland, extending to within about 3 miles of the Maroochy River on the North Coast, the Minister for Agriculture and Stock (Mr. W. Forgan Smith) has supplied the following information respecting the action that has already been taken and proposed to be taken, in order to give effect to the recommendations of the Bunchy Top Investigation Committee.

When Bunchy Top was found to be present in the Dayboro and Caboolture districts at the end of last December, an examination of the neighbouring plantations was made, with the result that the disease was found to have spread from the original area in which it was discovered and had become established in several parts of these districts, but not to as serious an extent as that met with in the plantations in which it was first discovered; and since then there has been no very serious extension of the disease in the district lying between the Brisbane and Caboolture Rivers. Unfortunately, prior to the discovery of Bunchy Top in the Dayboro and Caboolture districts, plants were sent from infected plantations to the Beerwah and Maroochy districts immediately to the north, but fortunately to only one property in each district; in both of which Bunchy Top has unfortunately made its appearance, and steps have been taken to destroy every stool that has shown a trace of the disease, so that it is believed that its further spread in a northerly direction has been stopped. In order, however, to prevent any chance of spreading the disease by means of infected plants, the transfer of plants in any part of the State was totally prohibited by a proclamation issued on the 28th April last. At the same time a careful examination of some 800 plantations—not counting back-yard gardens—has been made in the district extending from Gympie in the north to Eumundi in the south, of the Mary Valley as far as Kenilworth, and the area between Eumundi and the Maroochy River is now being inspected. So far no Bunchy Top has been discovered to the north of the Maroochy River in the southern part of the State, though there has been a slight outbreak in the Innisfail district of Northern Queensland as a result of infected plants having been sent there from the Dayboro district prior to the Department having any knowledge that the disease was present in that area.

The Northern outbreak is well in hand and, should there be no further indication of the trouble within the next few months, it may reasonably be assumed that the disease has been stamped out in that part of the State.

Every Precaution against Further Infestation Necessary.

Bunchy Top is, however, a disease of such an insidious nature that every precaution must be taken to prevent its spread in a northerly direction, and even though no trace of the disease has been found in the area inspected to the north of the Maroochy River, it is not deemed advisable to permit the transfer of plants from one part to another of this district until a second examination of the plantations in the district has been made, as there is a possibility that the disease may be present in a dormant or latent condition that will not show up until the spring growth takes place. At the same time, in order that the planting may not be unreasonably delayed, permission is being granted to growers who wish to extend their present plantations to plant a further area with plants that have been obtained from their present plantations, subject to their being examined and no trace of Bunchy Top being found.

Transfer of Plants.

Immediate steps will be taken to carry out a further inspection of this area, and it is hoped, should such inspection fail to reveal any trace of Bunchy Top, that permission to sell or transfer plants in that part of the district that is bounded on the south by the parishes of Maroochy and Maleny will be given about the end of October, subject to their first being inspected and found free of disease. No banana plants will be permitted to enter this part of the district from any part of Queensland, but plants may be sent out of this area to other parts of the State, subject to such conditions as may be deemed advisable, other than the area lying to the north of the Herbert River, into which no banana plants from any other place will be permitted entry.

In order to prevent the further spread of Bunchy Top from the area extending from New South Wales border to the Caboolture River, no banana plants will be permitted to be sent from any part of this area to any part of the area lying between

the Caboolture and Maroochy Rivers or from this latter area to the area extending from the Maroochy River to the northern boundaries of the parishes of Maroochy and Maleny. This will provide a threefold check—firstly, at the Caboolture River; secondly, at the Maroochy River; and thirdly, by the establishment of a buffer area—so far believed to be clean—between the Maroochy River and the northern boundaries of the abovenamed parishes.

In the area in which Bunchy Top exists—viz., from the New South Wales border to the Maroochy River—the transfer and sale of banana plants will only be permitted to take place within this area subject to the abovementioned restrictions, and then not until an examination of the plantations from which the sale or transfer of such plants has been made and no trace of Bunchy Top has been discovered, nor have any signs of the disease ever been seen in the plantation.

No plants will on any consideration be permitted to be transferred or sold from any plantation in which Bunchy Top is present or is known to have been present.

That part of the State lying to the north of Gympie and extending to the Herbert River has only been partially inspected, but an inspection will be made of all plantations in the banana-growing areas as soon as possible. No Bunchy Top has been discovered in this area so far, and should a further examination show that there is no Bunchy Top present the transfer of plants will be permitted on similar conditions to those applying to the area immediately to the south of Gympie.

BLACK-GROWN MAIZE.

The Minister for Agriculture (Hon. W. Forgan Smith) made the following announcement to the Press recently:—

“I notice in the Press a report from Grafton dealing with the views of Mr. H. Wenholz, a maize specialist attached to the New South Wales Department of Agriculture, on the proposed embargo on the importation of black-grown maize.

“The resolution regarding the embargo was carried unanimously at the Conference of State Ministers of Agriculture held in Brisbane recently, and at which the New South Wales Government was represented by the permanent head of that State's Agricultural Department. The reasons for the carrying of the resolution were stated at the time and reported in the daily Press. Briefly, they were that, as Australia has adopted certain living standards, the product of Australian labour should not be subject to the competition of products grown by coloured labour in other countries where a much lower standard of living prevails. The granting of an embargo by the Commonwealth Government necessarily carries with it the right of the Minister for Trade and Customs to lift the embargo in the event of any shortage of production in Australia. It also carries with it a moral obligation on the part of the local producer to provide for Australian requirements at reasonable prices. Mr. Wenholz may be a specialist in the culture of maize, but I cannot accept him as an authority either on economics or on the fiscal policy that a country should adopt. Before proceeding to pass strictures on the recent Brisbane Conference of State Ministers of Agriculture, he would have been well advised to consult with the head of his own department, who was a party to the resolution, and with which Mr. Wenholz appears to be in conflict.”

SOME RECENTLY DESCRIBED PLANTS.

In continuance of the series of illustrated notes on recently described plants, two more species are illustrated in this issue. These were described by Mr. C. T. White, the Government Botanist, and Mr. W. D. Francis, Assistant Botanist, in the proceedings of the Royal Society of Queensland for 1925. The specimens shown on Plate 69 are from *Melicope stipitata*, a small tree with sparse foliage, slate-coloured bark and white flowers. The tree was originally found at Glenallyn, Malanda, North Queensland, by Mr. H. C. Hayes. On Plate 70, specimens of *Elaeodendron microcarpum* are represented. This species is also a small tree. It was found at Mount Perry by Mr. James Keys and at Imbil by Mr. W. R. Petrie. Mr. Keys's specimens have been in the Queensland Herbarium for some years under the name of *Elaeodendron australe* and were recognised recently as undescribed during the critical examination of Mr. W. R. Petrie's specimens.



PLATE 69.

Melicope stipitata (new species), about one-half natural size. Fig. 2, bud $\times 6$; Fig. 3, petals enlarged; Fig. 4, stamen $\times 6$; Fig. 5, stipitate ovary $\times 6$; Fig. 6 cocci after dehiscence.

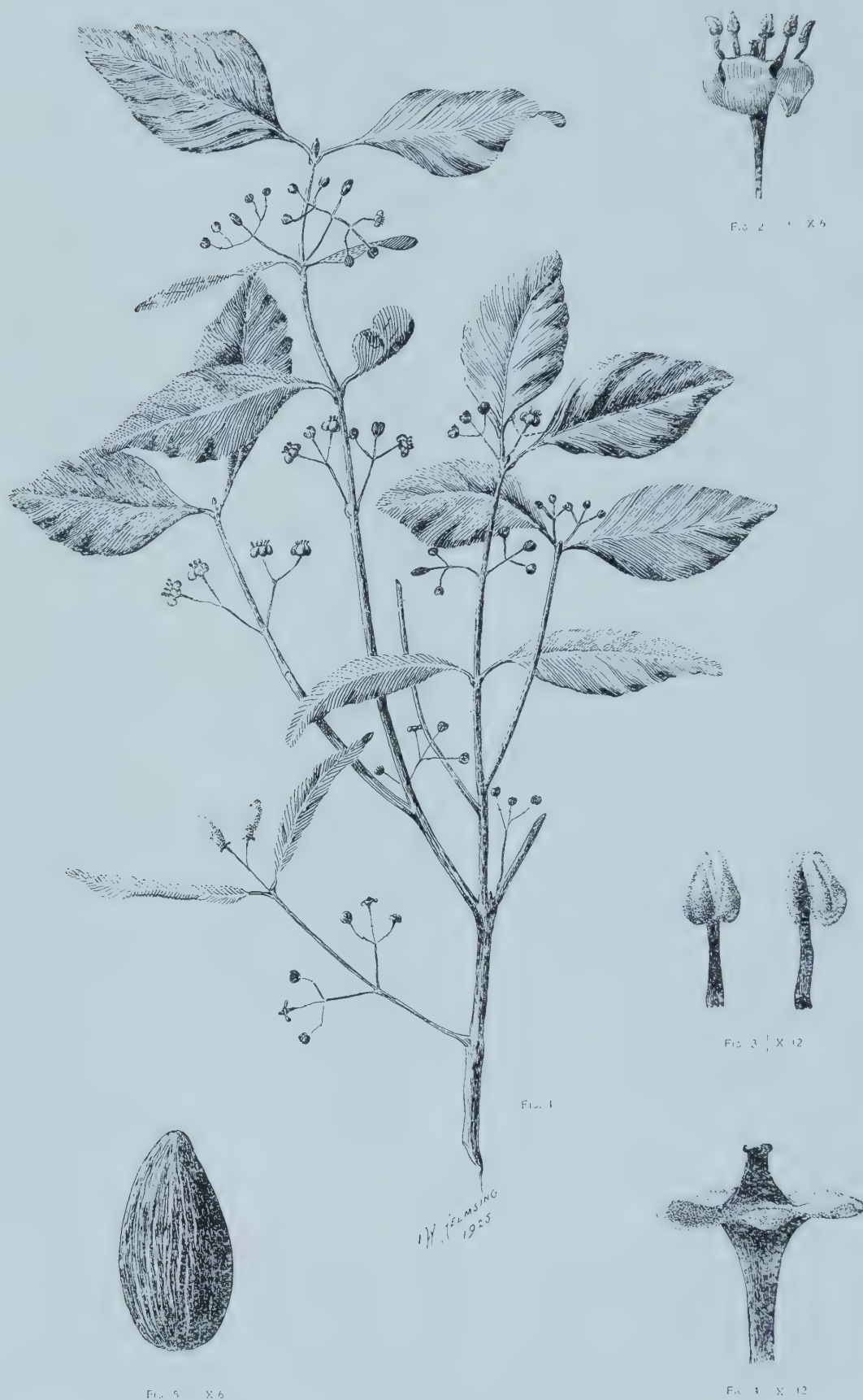


PLATE 70.

Elæodendron microcarpum (new species). Fig. 1, about one-half natural size; Fig. 2, flower $\times 6$; Fig. 3, stamens $\times 12$; Fig. 4, flower with petals and stamens removed $\times 12$; Fig. 5, seed $\times 6$.

ROYAL NATIONAL EXHIBITION.

THE AWARDS.

DISTRICT EXHIBITS.

An exceptionally fine display of products was arranged by the North Coast and Tableland of New South Wales, and this district is commended upon winning the Chelmsford Shield with 1,250 points. Wide Bay and Burnett was second, scoring 61½ points less, and the South Coast of Queensland secured 1,019½ points. In the respective sections, the North Coast and Tableland of New South Wales was first in dairy produce, in fruits, vegetables, and roots, &c., in grain, &c., first in hay, chaff, &c., in wool, in enlarged photographs, and in effective arrangement. It was also equal for first in wines and tobacco. Wide Bay and Burnett was first in manufactures and trades, in mineral and building materials, and equal for first with the winners in wines and tobaccos. Altogether it was a very fine contest, particularly between the first and second placed exhibits, but the fact that the New South Wales exhibit gained so many for effective arrangement—72 out of a possible 80—showed that those responsible know exactly how best to display the goods they produce. That is what the public desires, and it behoves Queensland exhibitors to profit by this year's experience, to heed the lesson that is to be obtained from the winning exhibit from the mother State, the directors of which are cordially congratulated on their success. Details:—

	Possible Points.	Northern Coast and Tablelands, N.S.W.	South Coast of Queensland.	Wide Bay and Burnett District.
DAIRY PRODUCE —				
Butter, 1 box, 56 lb.	90	82	80	81½
Milk (condensed, concentrated, or dried), and by-products	40	38	..	12
Cheese, not less than 1 cwt.	60	53	50	50
Eggs (suitable for domestic use), 1 doz. each variety	20	12	15	18
Totals	210	182	145	161½
FOODS—				
Hams and bacon	50	45	50	42
Roll'd and smoked beef and mutton	20	15	18	14
Smallgoods and sausages, if smoked or pre- served	10	8	9	8
Fish—Smoked, preserved, or canned	10	4	6	8
Canned meats	25	18	23	18
Lard, tallow, and animal oils	20	16	18	15
All butchers' by-products not included in other parts of scale	10	8	8	6
Honey, and by-products thereof	20	15	10	17
Confectionery, factory made	10	10	10	10
Bread, biscuits, scones, and cakes, factory made	10	9	10	10
Totals	185	148	162	148

DISTRICT EXHIBITS—*continued.*

	Possible Points.	Northern Coast and Tablelands, N.S.W.	South Coast of Queensland.	Wide Bay and Burnett District.
FRUITS, VEGETABLES, AND ROOTS—				
Fresh fruit—all kinds	60	46	35	54
Preserved fruits, jams, jellies	30	29	20	22
Crystallised and dried fruits	20	20	..	15
Fresh vegetables—all kinds, including table pumpkins, but excluding potatoes ..	25	17	21	19
Preserved and dried vegetables, pickles, sauces	10	9	9	6
Potatoes, English and sweet	40	27	36	24
Roots (10 lb. of each), all kinds, and their products, including meals (1 lb. of each), arrowroot, cassava, &c.	14	9	8	11
Cocanuts, peanuts, and other nuts ..	10	7	4	6
Totals	209	164	133	157
GRAIN—				
Wheat	50	47	15	32
Flour, bran, pollard, macaroni, and meals prepared therefrom	10	5	8	9
Maize	50	47	38	36
Maizena, meals, starch, glucose, and corn-flour	10	7	4	6
Oats, rye, rice, barley, malt, pearl barley, and their meals	30	28	20	22
Totals	150	134	85	105
MANUFACTURES AND TRADES—				
All woolwork	30	18	26	25
All metal and iron work	30	10	28	28
Leather, all leather work and tanning ..	20	18	19	16
Manufactured woollen and cotton fibre ..	30	25	..	20
All tinwork	10	8	7	9
Artificial manures	10	3	7	7
Brooms and brushes	10	5	6	4
Manufactures not enumerated	15	15	15	12
Totals	155	102	108	121
MINERALS AND BUILDING MATERIALS—				
Gold, silver, copper, and precious stones ..	25	16	4	18
Coal, iron, other minerals, and salt ..	30	18	10	20
Stone, bricks, cement, marble, terra-cotta ..	20	12	12	14
Woods—Dressed, undressed, and polished ..	25	21	23	21
Totals	100	67	49	73
TROPICAL PRODUCTS—				
Sugar-cane	60	54	45	48
Sugar (raw and refined)	20	15	10	16
Rum, other spirits, and by-products ..	10	..	7	10
Coffee (raw and manufactured), tea, and spices	10	8	6	10

DISTRICT EXHIBITS—*continued.*

	Possible Points.	Northern Coast and Tablelands, N.S.W.	South Coast of Queensland.	Wide Bay and Burnett District.
TROPICAL PRODUCTS—<i>continued.</i>				
Cotton (raw) and by-products	30	18	16	17
Rubber	10	..	..	10
Oils (vegetable)	10	10	..	10
Totals	150	105	84	121
WINES, ETC.—				
Aerated and mineral spa	15	10	5	6
Water, vinegar, and cordials	10	5	8	9
Totals	25	15	13	15
TOBACCO—				
Tobacco (cigar and pipe), in leaf	20	20	15	20
HAY, CHAFF, AND GRASSES—				
Hay—Oaten, wheaten, lucerne, and other varieties	30	29½	12	18
Grasses and their seeds	10	9½	7	8
Chaff—Oaten, wheaten, lucerne, and other varieties	50	40	22	35
Ensilage and other prepared cattle fodder ..	20	10	12	15
Sorghums and millets, in stalk	10	8	5	8
Commercial fibres (raw and manufactured)	10	8	9½	7
Pumpkins and other green fodder	10	9	9	6
Broom millet, ready for manufacture ..	10	6	8	9
Farm seeds, including canary seed	13	11	9	10
Totals	163	131	93½	116
WOOL—				
Scoured wool	40	39	37	35
Greasy wool	60	59	39	47
Mohair	10	8	..	9
Totals	110	106	76	91
ENLARGED PHOTOGRAPHS—				
Enlarged photographs of district scenery and locally-bred live stock	5	4	3	..
EFFECTIVE ARRANGEMENT—				
Comprehensiveness of view	20	18	14	15
Arrangement of sectional stands	25	22	18	17
Effective ticketing	10	10	4	9
General finish	25	22	17	18
Totals	80	72	53	59
Grand Totals	1,562	1,250	1,010½	1,188½



PLATE 71. —ILLUSTRATING THE DEPARTMENTAL CAMPAIGN FOR HERD IMPROVEMENT.



PLATE 72.—PITTSWORTH CHEESE HAS ALREADY WON FAME AT WEMBLEY, DUNEDIN, AND IN THE WORLD'S MARKETS. FINE EXHIBIT OF A PRODUCT OF THE DARLING DOWNS.

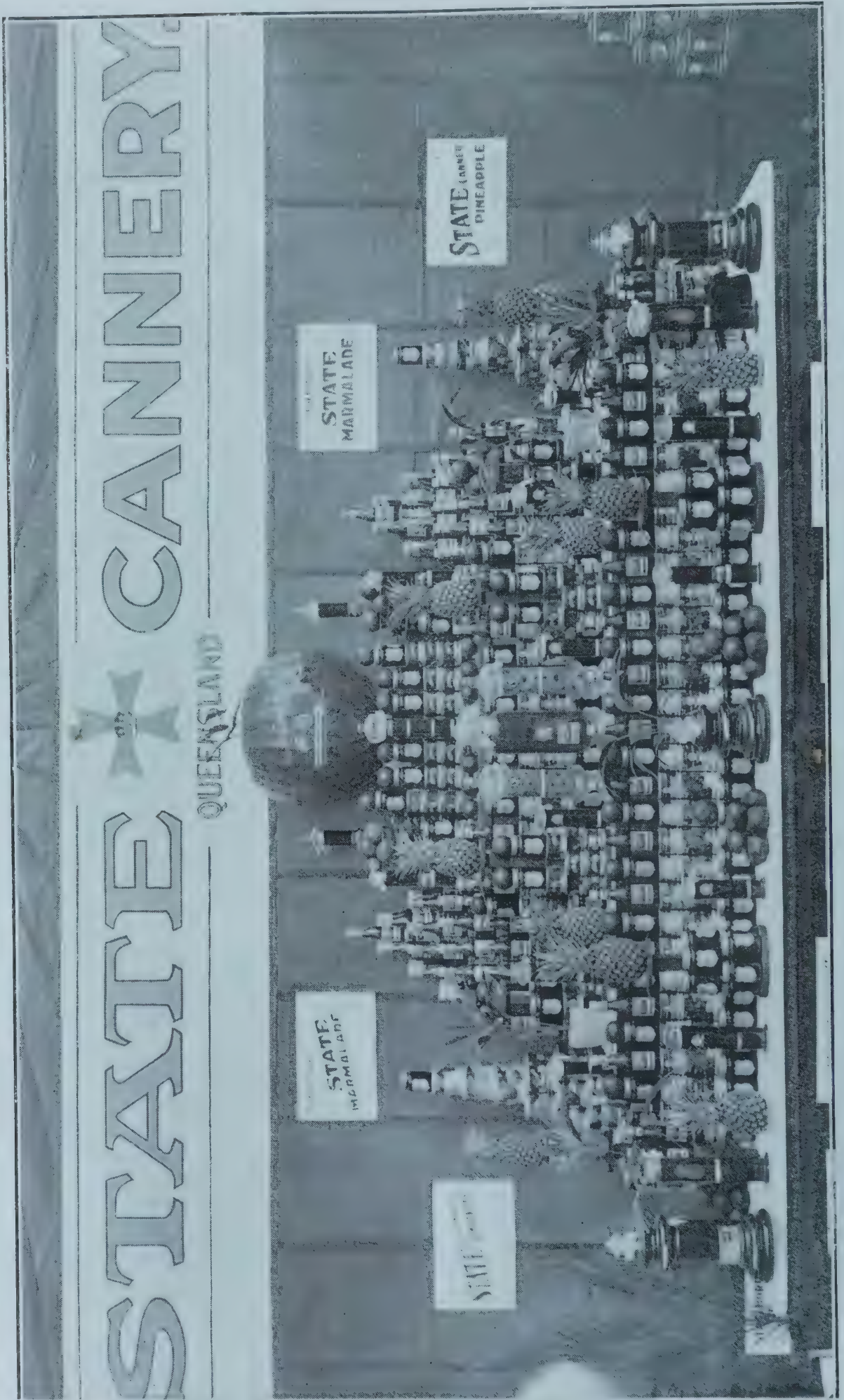


PLATE 73.—PRODUCTS OF THE QUEENSLAND STATE CANNERY.

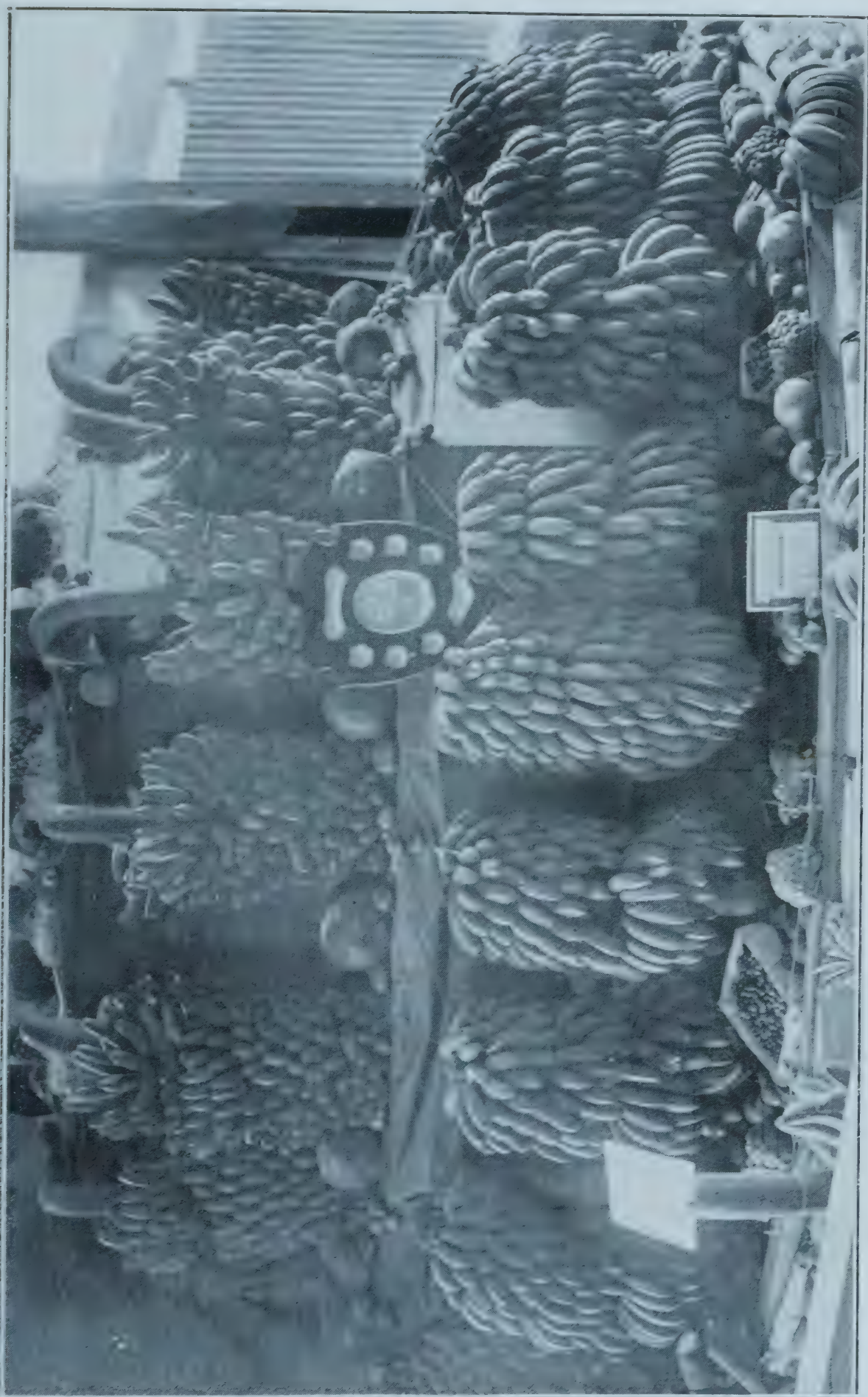


PLATE 74. QUEENSLAND BANANAS.

Queensland can supply the whole of the Commonwealth with Fruit of Unequalled Quality.

PRIMARY PRODUCTS.

BRISBANE VALLEY WINS—NORTHERN DARLING DOWNS SECOND.

The winning exhibit secured an aggregate of 1,089½ points out of a possible 1,297, and 125½ points better than the Northern Darling Downs, which gained 964 points. An analysis of the detailed points will show where the contest was won and lost. The fact that all exhibits each secured over 800 points proves that each of the five was a worthy exhibit.

The result of the contest in the Primary Products Only was a meritorious win for Brisbane Valley, an offshoot really of the West Moreton district. Details:—

	Possible Points.	Woodford and Kilcoy.	Northern Darling Downs.	Nanango.	Brisbane Valley.	Kingaroy.
DAIRY PRODUCE—						
Butter, 1 box, 56 lb.	90	81½	80½	82	81½	81
Cheese, not less than 1 cwt.	60	35	54	45	56	45
Eggs (suitable for domestic use)	20	14	12	16	18	12
Totals	170	130½	146½	143	155½	138
FOODS—						
Hams, bacon, rolled and smoked beef and mutton	50	40	39	38	46	42
Fish (smoked)	10	6	5	..	7	..
Lard, tallow, and animal oils	20	15	15	15	20	15
Honey and by-products thereof	20	12	11	7	16	12
Confectionery (home-made)	10	3	2	1	6	1
Biscuits, bread, cakes, and scones (home-made)	10	7	8	7	7	2
Totals	120	83	80	68	102	72
FRUITS, VEGETABLES, AND ROOTS—						
Fresh fruits—all kinds	60	48	54	20	54	20
Preserved fruits, jams, jellies (home- made)	30	25	20	20	23	16
Crystallised and dried fruits (home- made or dried)	20	18	16	16	18	13
Fresh vegetables—all kinds, including table pumpkins, but excluding po- tatoes	25	18	20	13	19	16
Preserved and dried vegetables, pickles, sauces (home-made or dried)	10	8	8	9	9	5
Potatoes, English and sweet	40	34	29	30	36	32
Roots (10 lb. of each), all kinds, and their products, including meals (1 lb. of each), arrowroot, cassava, &c.	14	12	7	6	12	10
Cocoonuts, peanuts, and other nuts	10	5	3	6	7	9
Vegetable seeds	10	8	7	6	7	7
Totals	219	176	164	126	185	128
GRAIN—						
Wheat	50	20	40	28	38	40
Flour, bran, pollard, macaroni, and meals prepared therefrom	10	3	9	6	..	8
Maize	50	46	34	32	48	46
Maizena, meals, starch, glucose, and cornflour	10	3	6	6	7	6
Oats, rye, rice, barley, malt, pearl bar- ley, and their meals	30	18	20	22	24	26
Totals	150	90	109	94	117	126

PRIMARY PRODUCTS—*continued.*

	Possible Points.	Woodford and Kilcoy.	Northern Darling Downs.	Nanango.	Brisbane Valley.	Kingaroy.
WOODS—						
Woods, dressed, undressed, and polished	25	22	24	22	24	23
Wattle bark	15	12	12	12	14	12
Totals	40	34	36	34	38	35
HIDES—						
Hides and home preserved skins for domestic use	15	15	13	14	15	12
TROPICAL PRODUCTS—						
Sugar-cane	60	20	5	5	35	22
Coffee, tea, and spices	10	4	8	..	7	7
Cotton (raw), and by-products	30	24	26	18	25	21
Totals	100	48	39	23	67	50
MINERALS—						
Gold, silver, copper, and precious stones	25	10	7	15	13	9
Coal, iron, and other minerals, and salt	30	13	18	14	16	9
Totals	55	23	25	29	29	18
TOBACCO—						
Tobacco (cigar and pipe), in leaf	20	16	20	12	20	17
HAY, CHAFF, AND GRASSES—						
Hay—Oaten, wheaten, lucerne, and other varieties	30	20	26	12	29	20
Grasses and their seeds	10	7	8	7	9	7
Chaff—Oaten, wheaten, lucerne, and other varieties	50	40	42	42	49	40
Ensilage and other prepared cattle fodder	20	13	10	12	18	16
Sorghums and millets, in stalk	10	7	8	8	9	9
Commercial fibres, hemp, and flax	15	7	10	8	11	10
Pumpkins, and other green fodder	10	9½	8	7	9	8
Broom millet, ready for manufacture	10	3	9½	9	8	8
Farm seeds, including canary seed	13	9	10	8	10	9
Totals	168	115½	131½	113	152	127
WOOL—						
Scoured wool	40	32	37	36	36	36
Greasy wool	60	40	59	35	51	46
Mohair	10	5	9	8	9	7
Totals	110	77	105	79	96	89

PRIMARY PRODUCTS—*continued.*

	Possible Points.	Woodford and Kilcoy.	Northern Darling Downs.	Nanango.	Brisbane Valley.	Kingaroy.
ENLARGED PHOTOGRAPHS—						
Enlarged photographs of district scenery and locally-bred live stock	5	3	3	3	3	2
LADIES' AND SCHOOLS' WORK AND FINE ARTS—						
Needlework and knitting	25	22	15	14	20	15
School needlework	5	4	3	2	4	3
Fine arts	5	2	3	3	5	2
School work, maps, writing, &c. ..	10	7	3	7	8	8
Totals	45	35	24	26	37	28
EFFECTIVE ARRANGEMENT—						
Comprehensiveness of view	20	12	19	14	18	13
Arrangement of sectional stands ..	25	14	20	15	22	14
Effective ticketing	10	7	9	6	10	6
General finish	25	16	20	16	23	16
Totals	80	49	68	51	73	49
Grand Totals	1,297	895	964	815	1,089½	891



PLATE 75.—PRODUCTS OF THE MARKET GARDEN.

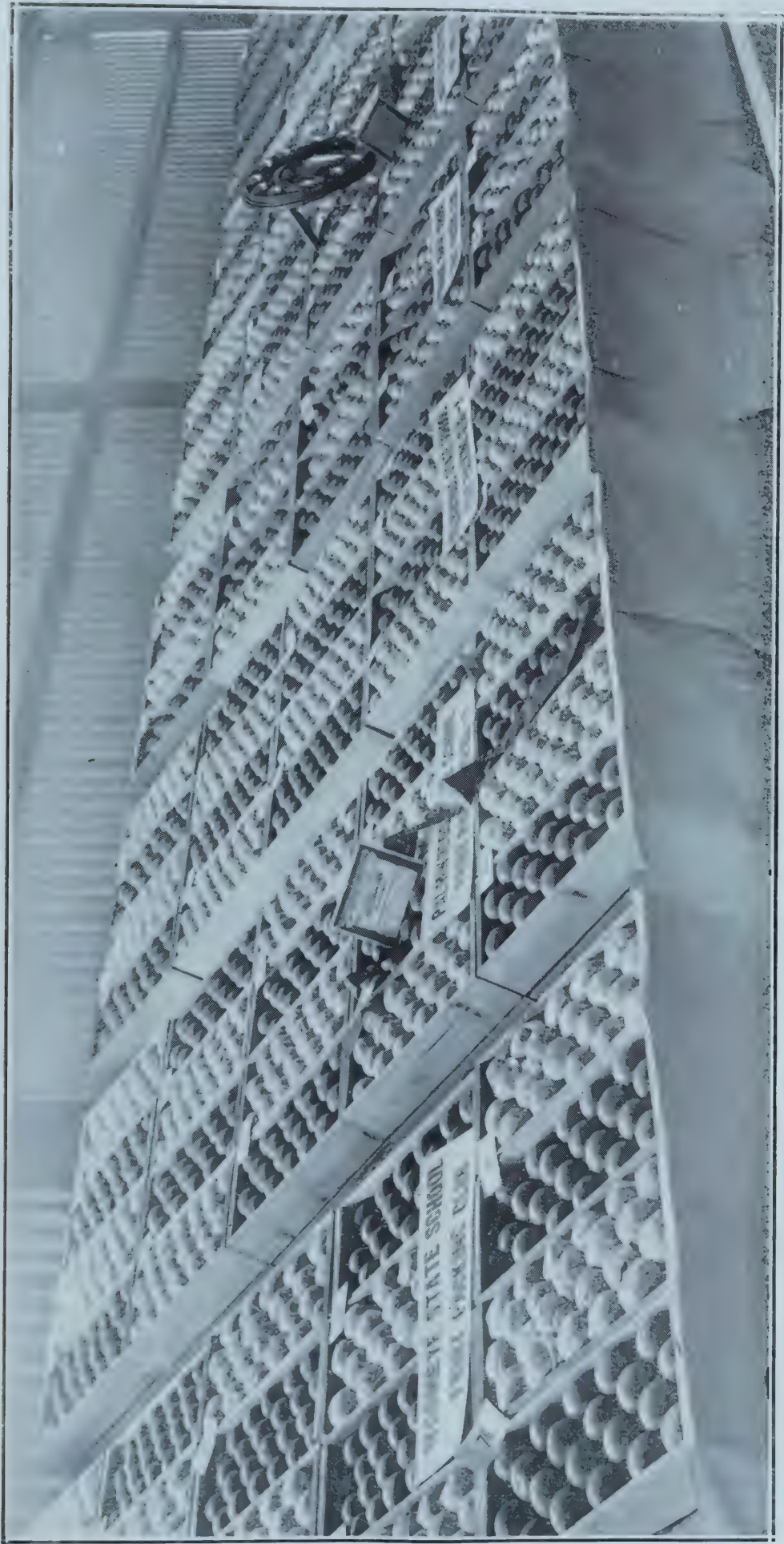


PLATE 76.—ENCOURAGING THE YOUNG IDEA.
A Practical Demonstration of the Efficiency of Queensland Scholars in the Orcharding Districts of the State.

TROPICAL PRODUCTS.

North Queensland, the only exhibit entered for the tropical products' trophy, secured 852 points out of the possible 1,352 points. The maximum points were awarded in raw and refined sugars. Cotton, hams, bacons, and cheese were items in which large percentages were obtained, but there was an absence of butter. To have obtained such high percentages in articles brought long distances must be gratifying to the promoters, and those who carried out the arrangements at the Exhibition. The full points are as follows:—

	Maximum Points.	North Queensland.
DAIRY PRODUCE—		
Butter, 1 box, 56 lb.	90	..
Milk (any form), cream	10	..
Cheese, 1 cwt.	60	53
Eggs (suitable for domestic use)	20	3
Totals	180	56
FOODS—		
Hams, bacon, rolled and smoked beef, and mutton ..	50	30
Smallgoods and sausages	5	2
Canned meats	25	25
Fish—Smoked, preserved or canned	10	..
Lard, tallow, and animal oils	20	15
All butchers' by-products not included in any other parts of scale	10	8
Honey and by-products thereof	20	12
Confectionery	10	2
Biscuits, bread, cakes, scones	10	7
Totals	160	101
FRUIT, VEGETABLES, AND ROOTS—		
Fresh fruits—all kinds	60	49
Preserved fruits, jams, and jellies	20	20
Crystallised and dried fruits	20	18
Fresh vegetables, all kinds, including table pumpkins, but excluding potatoes	25	18
Preserved and dried vegetables, pickles, and sauces ..	10	9
Potatoes, English and sweet	40	32
Roots (10 lb. of each), all kinds, and their products, in- cluding meals (1 lb. of each), arrowroot, cassava, &c. ..	14	12
Cocoanuts, peanuts, and other nuts	10	8
Vegetable seeds	10	3
Totals	209	169
GRAIN—		
Maize, in cob (12 cobs of each variety)	25	18
Maize, shelled	25	18
Totals	50	36
MANUFACTURES AND TRADES—		
Wattle bark	15	11
Hides (1) and preserved skins	15	14
Totals	30	25
MINERALS AND BUILDING MATERIALS—		
Gold, silver, copper, and precious stones	25	11
Coal, iron, and other minerals, and salt	30	22
Stone, bricks, cement, marble, terra-cotta	20	12
Woods, dressed, undressed, and polished	25	23
Totals	100	68

TROPICAL PRODUCTS—*continued.*

	Maximum Points.	North Queensland.
TROPICAL PRODUCTS—		
Sugar-cane	60	58
Sugar (raw and refined)	20	20
Rum, other spirits, and by-products	10	5
Coffee (raw and manufactured), tea, spices	10	8
Cotton (raw) and by-products	30	20
Rubber	10	..
Oils (medical and machinery)	15	12
Totals	155	123
WINES—		
Wines	15	..
Vinegar, cordials, aerated, and mineral spa waters	10	8
Totals	25	8
TOBACCO—		
Cigars, cigarettes, and snuff	10	..
Tobacco (raw)	20	15
Total	30	15
HAY, CHAFF, AND GRASSES—		
Hay—Oaten, wheaten, lucerne, and other varieties	30	12
Grasses and their seeds	10	8
Chaff—Oaten, wheaten, lucerne, and other varieties	50	20
Ensilage and other prepared cattle fodder	20	5
Sorghums and millets in stalk	10	8
Commercial fibres, hemp, flax	15	..
Pumpkins and other green fodder	10	7
Broom millet (ready for manufacture)	10	5
Farm seeds, including canary seed	13	9
Totals	168	74
WOOL—		
Scoured wool	40	40
Greasy wool	60	55
Mohair	10	..
Totals	110	95
LADIES' AND SCHOOLS' WORK AND FINE ARTS—		
Needlework and knitting	25	20
Essay by pupil of school in district on "Value of Agriculture,"	10	7
School work, maps, &c.	5	4
Fine Arts	5	2
School needlework	5	..
Totals	50	33
ENLARGED PHOTOGRAPHS—		
Enlarged photographs of district scenery and locally-bred stock	5	3
EFFECTIVE ARRANGEMENT—		
Comprehensiveness of view	20	15
Arrangement of sectional stands	25	12
Effective ticketing	10	3
General finish	25	16
Totals	80	46
Grand Totals	1,352	852

ONE-MAN FARM.

Mr. L. O. Christensen, the only exhibitor for the one-man farm competition, obtained 443 out of the possible 661 points. High places were gained in the hays and chaffs, wools, and dairy produce sections, but in tropical products the points awarded fell below the 50 per cent. mark. Against that, the possible points were given for tobacco, both in dried and in leaf. For effectiveness of display, the judges decided upon 25 out of 50 points. Detailed particulars of the decisions are as follows:—

	Possible Points.	L. O. Christensen. Crow's Nest.
DAIRY PRODUCE—		
Butter, 1 lb.	25	20
Cheese, 1 large (10 lb.), or 2 small (5 lb. each), home-made	20	17
Eggs (suitable for domestic use)	5	5
Totals	50	42
FOODS—		
Hams (15 lb.), bacon (15 lb.), home-cured	20	18
Corned, smoked, and spiced beef and mutton (10 lb.)	10	9
Honey, any variety, and by-products thereof	15	8
Beeswax, 6 lb.	5	2
Bread (2 loaves), scones (1 dozen)	5	3
Confectionery and sweets, 3 lb.	5	1
Home cookery, including cakes, biscuits, and other foods	7	..
Lard, tallow, and animal oils	5	4
Totals	72	45
FRUITS, VEGETABLES, AND ROOTS —FRESH AND PRESERVED—		
Fresh fruits—all kinds	25	15
Crystallised and dried fruits	10	6
Preserved fruits, jams, and jellies	15	8
Fresh vegetables	15	5
Pickles and sauces	15	7
Potatoes and roots	25	20
Table pumpkins, squashes, and marrows, 56 lb.	10	8
Cocoanuts and other nuts	7	3
Vegetable and garden seeds	5	3
Arrowroot, 10 lb.	5	5
Sugar beet, 3 lb.	5	4
Cassava, 3 lb.	5	..
Ginger, 3 lb.	5	3
Totals	147	87
GRAIN—		
Wheat	25	21
Maize	25	23
Barley, oats, rye, and rice	20	12
Home-made meals from above varieties of grain, 7 lb. of each variety	10	7
Totals	80	63
TROPICAL PRODUCTS—		
Sugar-cane, 24 stalks or one stool	30	9
Cotton, in seed	20	12
Coffee	5	5
Totals	55	26

ONE-MAN FARM—*continued.*

	Possible Points.	L. O. Christensen, Crow's Nest.
TOBACCO—		
Tobacco, in leaf, dried	10	10
HAY, CHAFF, AND GRASSES —		
Hay—Oaten, wheaten, lucerne, and other varieties ..	20	15
Grasses and their seeds, including canary	10	6
Chaff—Oaten, wheaten, lucerne, and other varieties ..	20	18
Ensilage (any form)	15	15
Cattle fodder (pumpkins and green fodder)	15	13
Sorghum and millet, in stalk	10	8
Broom millet, 10 lb.	10	6
Cowpea seed, 7 lb.	7	7
Flax, 3 lb., hemp, 5 lb.	5	5
Totals	112	93
WOOL—		
Greasy, 3 fleeces	20	18
Mohair	5	4
Totals	25	22
DRINKS—		
Temperance drinks, 6 bottles	10	6
WOMEN'S AND CHILDREN'S WORK—		
Needlework and knitting	10	8
Fine arts	5	3
Fancy work	15	3
School work, maps, writing, &c.	5	..
Totals	40	14
MISCELLANEOUS ARTICLES OF COMMERCIAL VALUE	5	3
PLANTS AND FLOWERS, IN POTS	5	2
TIME AND LABOUR SAVING USEFUL ARTICLES MADE ON THE FARM	10	5
EFFECTIVE ARRANGEMENT—		
Comprehensiveness of view	10	8
Arrangement of stands	10	5
Effective ticketing	5	3
General finish	15	9
Totals	40	25
Grand Totals	661	443

BUTTER CONTESTS.

Keen competition prevailed in the butter contests, and in the four export classes the Oakey Co-operative Butter Association had a triumphant day, winning three of the first prizes. The entries this year were more numerous than at the last Royal National Show. A falling-off was noticeable in the cheese section, owing to the adverse weather conditions. The Cooranga district scored a victory in the coloured pasteurised class, while in the white pasteurised the Oakey Company scored its fourth success. Details:—

BUTTER FOR EXPORT.

30 days' storage, salted. One box, not less than 56 lb., suitable for Export.

	Flavour.	Texture.	Colour.	Saltng.	Packing, and Finish.	Total.
Possible points	65	20	7	4	4	100
Oakey District Co-operative Dairy Association, Ltd.	60	20	7	4	4	95
Southern Queensland Dairy Co., Ltd. ..	60	19½	7	4	4	94½
Downs Co-operative Dairy Association, Ltd., Dalby	59	20	7	4	4	94
Dayboro' Co-operative Dairy Association, Ltd.	59	20	6½	4	4	93½
Goombungee Dairy Co-operative Association, Ltd.	59	19½	7	4	4	93½
Queensland Farmers' Co-operative Association, Ltd., Laidley	59	20	7	3½	4	93½
Warwick Co-operative Dairy Association, Ltd., Millhill	58½	20	7	4	4	93½
Downs Co-operative Dairy Association, Ltd., Clifton.. .. .	59	19½	6½	4	4	93
Downs Co-operative Dairy Association, Ltd., Toowoomba	58	20	7	4	4	93
Maleny Co-operative Dairy Association, Ltd.,	58	20	7	4	4	93
Queensland Farmers' Co-operative Association, Ltd., Boonah	58	20	7	4	4	93
Wide Bay Co-operative Dairy Association, Ltd., Cooroy	58	19½	7	4	4	92½
Port Curtis Co-operative Dairy Association, Ltd.	57	19½	7	4	4	91½
Wide Bay Co-operative Dairy Association, Ltd., Gympie	57	19½	7	4	4	91½
Caboolture Dairy Association, Ltd., Caboolture	57	19½	6½	4	4	91
Caboolture Dairy Association, Ltd., Eumundi	56	20	7	4	4	91
Caboolture Dairy Association, Ltd., Pomona	57	19½	6½	4	4	91
Gayndah Co-operative Dairy Association, Ltd.	57	19½	6½	4	4	91
Maryborough Co-operative Dairy Association, Ltd., Maryborough	57	19½	6½	4	4	91
Maryborough Co-operative Dairy Association, Ltd., Kingaroy	56½	19½	6½	4	4	90½
Queensland Farmers' Co-operative, Co., Ltd., Booval	57	19½	6	4	4	90½
Warwick Co-operative Dairy Association, Ltd.	57	19½	6	4	4	90½
Downs Co-operative Dairy Co., Ltd., Crow's Nest	56	19½	6½	4	4	90
Maryborough Co-operative Dairy Association, Ltd., Biggenden	56½	19	6½	4	3½	89½
Maryborough Co-operative Dairy Association, Ltd., Mundubbera	56	19	6	4	4	89

BUTTER FOR EXPORT—*continued.*

8 weeks' storage, unsalted. One box, not less than 56 lb., suitable for Export.

	Flavour.	Texture.	Colour.	Salting.	Packing and Finish	Total.
Possible points	65	20	7	4	4	100
Goombungee Co-operative Dairy Association, Ltd.	59½	20	7	4	4	94½
Maleny Co-operative Dairy Association, Ltd.	59	20	7	4	4	94
Downs Co-operative Dairy Association, Ltd., Toowoomba	58½	20	7	4	4	93½
Warwick Co-operative Dairy Association, Ltd., Millhill	58	19½	7	4	4	92½
Caboolture Co-operative Dairy Association, Ltd., Caboolture	57	20	7	4	4	92
Southern Queensland Dairy Co., Ltd. ..	58	19½	6½	4	4	92
Queensland Farmers' Co-operative Association, Ltd., Laidley	57½	19½	6½	4	4	91½
Warwick Co-operative Dairy Association, Ltd., Allora	57	19½	7	4	4	91½
Oakey District Dairy Association, Ltd.	59	19	5	4	4	91
Queensland Co-operative Association, Ltd., Booval	56½	19½	7	4	4	91
Wide Bay Co-operative Dairy Association, Ltd., Gympie	57	19½	6½	4	4	91
Caboolture Co-operative Dairy Association, Ltd., Eumundi	56	19½	6½	4	4	90
Caboolture Dairy Association, Ltd., Pomona	56½	19½	6	4	4	90
Dayboro' Co-operative Dairy Association, Ltd.	57	19	6	4	4	90
Downs Co-operative Dairy Association, Ltd., Dalby	55½	10½	7	4	4	90
Maryborough Co-operative Dairy Association, Ltd., Biggenden	57	19	6½	4	3½	90
Queensland Co-operative Dairy Association, Ltd., Boonah	57	19	6	4	4	90
Wide Bay Co-operative Dairy Association, Ltd., Cooroy	56	19½	6½	4	4	90
Maryborough Co-operative Dairy Association, Ltd., Mundubbera	56	19½	6½	4	3½	89½
Downs Co-operative Dairy Association, Ltd., Crow's Nest	55	19½	6½	4	4	89
Maryborough Co-operative Dairy Association, Ltd., Kingaroy	55	19	6½	4	4	88½
Nanango Co-operative Dairy Association, Ltd.	54	19	6	4	4	87

8 weeks' storage, salted. One box not less than 56 lb., suitable for Export.

Oakey District Co-operative Dairy Association, Ltd.	60	20	7	4	4	95
Goombungee Co-operative Dairy Association, Ltd.	59	20	7	4	4	94
Maleny Co-operative Dairy Association, Ltd.	58½	20	6½	4	4	93
Caboolture Co-operative Dairy Association, Ltd., Pomona	57½	19½	7	4	4	92
Port Curtis Co-operative Dairy Association, Ltd.	57½	19½	7	4	4	92
Caboolture Co-operative Dairy Association, Ltd., Eumundi	57	19½	7	4	4	91½

BUTTER FOR EXPORT—*continued.*

8 weeks' storage, salted. One box not less than 56 lb., suitable for Export—*continued.*

	Flavour.	Texture.	Colour.	Saltng.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Downs Co-operative Dairy Association, Ltd., Crow's Nest	57	19½	7	4	4	91½
Southern Queensland Dairy Association, Ltd.	58	19½	6	4	4	91½
Wide Bay Co-operative Dairy Association, Ltd., Gympie	57	19½	7	4	4	91½
Downs Co-operative Dairy Association, Ltd., Toowoomba	56	20	7	4	4	91
Maryborough Co-operative Dairy Associa- tion, Ltd., Biggenden	57	19½	6½	4	4	91
Maryborough Co-operative Dairy Associa- tion, Ltd., Mundubbera	57	19½	6½	4	4	91
Queensland Farmers' Co-operative Dairy Association, Ltd., Booval	57	19½	6½	4	4	91
Wide Bay Co-operative Dairy Association, Ltd., Cooroy	57	19½	6½	4	4	91
Downs Co-operative Dairy Association, Ltd., Dalby	56	19½	7	4	4	90½
Nanango Co-operative Dairy Association, Ltd.	56½	19½	6½	4	4	90½
Warwick Co-operative Dairy Association, Ltd., Millhill	56½	19½	7	4	3½	90½
Caboolture Co-operative Dairy Association, Ltd., Caboolture	56	19½	6½	4	4	90
Queensland Farmers' Co-operative Associa- tion, Ltd., Boonah	55½	19½	6½	4	4	89½
Maryborough Co-operative Dairy Associa- tion, Ltd., Kingaroy	55	19½	6½	4	4	89
Queensland Farmers' Co-operative Associa- tion, Ltd., Laidley	56	19	6½	3	4	88½
Dayboro' Co-operative Dairy Association, Ltd.	56½	18½	5½	3½	4	88

8 weeks' storage, salted. One box, not less than 56 lb., manufactured in Queensland from Pasteurised Cream, suitable for Table Use in Britain.

Oakey District Co-operative Dairy Asso- ciation, Ltd.	60	20	7	4	4	95
Downs Co-operative Dairy Association, Ltd., Toowoomba	59	20	7	4	4	94
Caboolture Co-operative Dairy Association, Ltd., Eumundi	58½	20	7	4	4	93½
Southern Queensland Dairy Co., Ltd.	58½	19½	6½	4	4	92½
Warwick Co-operative Dairy Co., Ltd., Allora	57	19½	7	4	4	92½
Warwick Co-operative Dairy Association, Ltd., Millhill	58½	19½	7	3½	4	92½
Downs Co-operative Dairy Association, Ltd., Crow's Nest	57½	19½	7	4	4	92
Goombungee Co-operative Dairy Associa- tion, Ltd.	57	20	7	4	4	92
Queensland Farmers' Co-operative Asso- ciation, Ltd., Laidley	57	19½	7	4	4	91½
Caboolture Co-operative Dairy Association, Ltd., Caboolture	57	19½	6½	4	4	91
Caboolture Co-operative Dairy Association, Ltd., Pomona	56½	19½	7	4	4	91

BUTTER FOR EXPORT—*continued.*

8 weeks' storage, salted. One box, not less than 56 lb., manufactured in Queensland from Pasturised Cream, suitable for Table Use in Britain—*continued.*

	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Maleny Co-operative Dairy Association, Ltd.	57	19½	6½	4	4	91
Maryborough Co-operative Dairy Association, Ltd., Mundubbera	57	19½	6½	4	4	91
Nanango Co-operative Dairy Association, Ltd.	56½	19½	7	4	4	91
Queensland Farmers' Co-operative Association, Ltd., Boonah	56½	19½	7	4	4	91
Downs Co-operative Dairy Association, Ltd., Dalby	56	19½	7	4	4	90½
Maryborough Co-operative Dairy Association, Ltd., Biggenden	57	19½	6½	4	3½	90½
Queensland Farmers' Co-operative Association, Ltd., Booval	56½	19½	6½	3½	4	90
Dayboro' Co-operative Dairy Association, Ltd.	56	19	6	4	4	89
Maryborough Co-operative Dairy Association, Ltd., Kingaroy	55	19½	6½	4	4	89
Wide Bay Co-operative Dairy Association, Ltd., Gympie	55	19½	6½	4	4	89
Wide Bay Co-operative Dairy Association, Ltd., Cooroy	55	19	6	4	4	88

CHEESE.

In the first contest the Oakey district Kelvinhaugh factory won with 93½ points, with Biddeston Co-operative Dairy Association, Limited, second with 92; Cooranga North Co-operative Cheese Association was third with 91¾ points.

In the other class, export cheese, coloured pasteurised, two each 70-80 lb., Cooranga North Co-operative Cheese Association, Limited, had a good win with 94½ points. The runners-up were the Pittsworth Dairy Company "Y" factory with 93 points, and Biddeston Dairy Association, Limited, came third with 92½. Details:—

Export, white, pasteurised, suitable for English market; two, each 70 lb. to 80 lb.; six weeks' storage.

	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Oakey District Co-operative Dairy Association, Kelvinhaugh	44	25	15	9½	93½
Biddeston Co-operative Dairy Association, Ltd. ..	43	24¾	14¾	9½	92
Cooranga North Co-operative Cheese Association, Ltd.	42½	24¾	15	9½	91¾
Pittsworth Dairy Co., Ltd. "P" Factory ..	43	24	14½	10	91½
Downs Co-operative Dairy Association, Ltd., Koondai	41½	24	14½	8	88
Woodleigh Cheese Factory	39	24½	14½	9	87

CHEESE—*continued.*

Export, coloured, pasteurised, suitable for English market ; two, each 70 lb. to 80 lb. ; six weeks' storage.

	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Cooranga North Co-operative Cheese Association, Ltd.	45	25	14½	10	94½
Pittsworth Dairy Co., "P" Factory	44	24½	14½	10	93
Biddeston Co-operative Dairy Association, Ltd...	44	24½	14½	9½	92½
Downs Co-operative Dairy Association, Ltd., Koondai	43½	24½	14½	8	90½
Oakey District Co-operative Dairy Association, Ltd., Kelvinhaugh	42	24¼	14¼	9½	90
Pittsworth Dairy Co., Ltd., "Y" Factory ..	41½	24	14	9¾	89¼
Woodleigh Cheese Factory	39	24½	14½	9	87

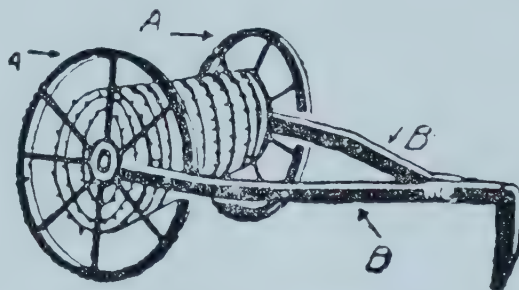
DISTRICT FRUIT EXHIBITS.

No better arranged displays or finer grades and classes of fruit have been staged at the Brisbane Exhibition. Every district and locality represented earned widespread popular appreciation for its distinctly creditable exhibit.

The noted fruitgrowing districts of Cooran, Kin Kin, Pinbarren, Montville, Palmwoods, and Woombye were well represented.

BARB WIRE REEL.

Barb wire is as pleasant to handle as the Scotch thistle, but this reel makes the job of building a fence a lot more pleasant. We need first a pair of light wheels 2 feet or more in diameter. A pair from an old wheel cultivator are about right, and light cart wheels or even bicycle wheels will do. These are shown at A in the drawing. For the axle a piece of 1-inch pipe will do. It will not be too large to allow the barb-wire spool to slip over it. One of the wheels can be fastened more or less permanently to the axle, but the other should be so fastened



A BARBED WIRE REEL.

as to come off easily to allow the wire spool to be slipped on the axle. Secure two pieces of light strap iron B or iron rod about half an inch in diameter. Bend one end of each so as to encircle the axle. Bend the free ends as shown, and fasten them together at the back. One of them should be about one foot longer than the other, and this is bent over at right angles and the end sharpened to a point. The right-angle piece acts as a handle for pulling or pushing the reel, and the point can be pushed into the ground to anchor it when desired.—“Country Gentleman.”

POULTRY FEEDING.

By P. RUMBALL, Poultry Instructor.

Possibly there is no problem more important to the successful poultry raiser than that of feeding. For this reason and to assist in the economical utilisation of the various foods available, poultry raisers should have a thorough knowledge of the principals underlying feeding. Although it is possible for many to purchase mixed feeds suitable for either egg production or the growth of young stock, it is not always advisable for the commercial poultry raiser to rely solely upon these foods, as the distance from the manufacturer adds considerably to their cost, and it may also be possible for the poultry keeper to utilise cheaper foods produced locally.

Poultry, as with all animals, require food first for the maintenance of the bodily functions—that is, the supplying of heat and energy and repair of waste tissue, the surplus only being used for the production of the growth of the body, or in the case of moulting stock the growth of feather, and in laying stock the production of eggs. It is possible, and it frequently happens, by incorrect feeding to retard the growth of growing stock, and in adult stock to just maintain the birds in perfect health without procuring the desired production of eggs. It is, therefore, essential for the poultry raiser to realise at the outset that under-feeding is not conducive to good results, and that it is as equally wasteful as over-feeding; also that the production of eggs or the bodily growth of young stock can only be obtained by feeding quantities in excess of the bodily requirements of the bird.

In dealing with feeding, it is desirable to go into the question of the exact composition of the body of the bird, the egg, and the varieties of foods available, and it is as well to define the terms used.

Water—composed of hydrogen and oxygen. It is present in large quantities in the body and all foods to a varying degree.

Protein is a compound built up of nitrogen, hydrogen, and oxygen, and a few minor constituents.

Fats and carbohydrate are compounds of carbon, oxygen, and hydrogen.

Ash—Mineral matter and represents the residue of burnt material.

COMPOSITION OF HEN AND EGG.*

Composition.	White Leghorn Hen.			Eggs as Purchased.		
Water	56.8	..	..	65.6
Protein	21.6	..	..	11.8
Ash	3.8	..	..	.7†
Fat	17.8	..	..	10.8
Shell	—	11.1

*Col. Bulletin 164. † Other than shell.

TABLE OF FOODS.

Composition of some Poultry Foods—Digestible Nutrients.

—			True Protein.	Carbo-hydrate.	Fibre.	Fat.	Nutritious Ratio.
Barley, Green .. ..	..	..	1.2	9.0	2.9	0.4	1 to 10.7
Lucerne, Green .. ..	..	..	3.0	6.1	3.4	0.3	1 to 3.4
Pumpkins .. ..	..	..	1.1	7.0	2.6	0.7	1 to 10.2
Dry Lucerne Chaff or Meal ..	..	..	11.1	21.7	11.9	1.4	1 to 3.3
Barley .. ..	..	..	8.7	64.2	0.7	1.2	1 to 7.8
Maize .. ..	..	..	10.0	61.2	1.2	4.7	1 to 7.3
Cowpeas .. ..	..	..	17.3	52.0	1.1	0.8	1 to 3.2
Wheat .. ..	..	..	11.8	54.0	1.1	1.5	1 to 5.0
Feterita .. ..	..	..	10.1	65.4	..	2.4	1 to 7.0
Oats, Hulled .. ..	..	..	11.4	57.7	..	7.5	1 to 6.5
Bran .. ..	..	..	11.0	34.5	1.6	1.8	1 to 3.6
Pollard .. ..	..	..	13.9	47.0	1.7	4.8	1 to 4.3
Peanut Meal .. ..	..	..	33.8	11.6	0.6	7.2	1 to 9.0
Oil Cake (Sunlight) .. ..	..	..	15.6	38.6	4.0	10.4	1 to 4.3
Bone Meal, Fresh .. ..	..	..	18.3	..	..	24.5	1 to 3.0
Meat Meal .. ..	..	..	54.3	..	..	10.55	1 to 40½
Buttermilk .. ..	..	..	3.4	4.9	..	0.1	1 to 1.5
„ Dry .. ..	..	..	29.3	41.0	..	6.2	1 to 1.9
Milk, Skim .. ..	..	..	3.6	5.2	..	0.1	1 to 5.0
Blood, Dry .. ..	..	..	52.4	..	..	2.5	1 to 0.1

Use of Various Elements in the Body.

Water.—Since the fowl's body contains approximately 57 per cent. of water and eggs 65 per cent., the need of a good water supply should be evident. Although water is cheap, it is too frequently neglected. A good supply of clean, cool water is essential for best results. As will be seen in the table of the analyses of foods, water is present in a varying degree, and according to the quantity present so is the value of the food generally lessened.

Protein.—Protein is essentially a supply of building material, and is found in all muscular development. It is necessary for the repair of waste tissue, and poultry being of a very active nature, the demand is consequently heavy. It is also necessary for high egg production. Foods rich in protein are meat scrap or dried meat meals of all descriptions, fish meals, insect life, worms, milk, and other animal products. Vegetable proteins are rich in beans, peas, cotton seed meal, peanut meal, &c. Animal protein, however, has been found to be more suitable to poultry requirements, either by reason of the fact that they are more palatable or more readily digested.

Carbohydrate and Fats.—Carbohydrates are found in the form of starch and sugars, and together with fats are largely used by poultry. Their principle function is the production of heat and energy and the formation of the body fats. Hens, before the laying season, either during the growing stage or while moulting, store up certain quantities, which are used up after the bird commences to produce. In table birds, certain quantities of fat adds to the quantity of the stock, but it is always desirable to guard against large quantities of abdominal fats.

Ash.—This is the residue of burnt foods and represents the mineral matter drawn from the soil by plant life. As a general rule, stock that has free range and live on herbage obtain sufficient quantities of mineral matter, but with poultry, more especially those confined, the absence of mineral matter in their food is frequently noticed. This is due to the fact that the ash content of the grain is generally less than that of the whole plant. Liberal supplies of green feed, especially green lucerne, and, failing green lucerne, lucerne meal or lucerne dust, will largely make good this deficiency. Skim milk is an excellent food by which the mineral contents of food may be augmented, and bone meal, the larger part of which is calcium phosphate, mineral matter essential for the boney framework of the body, is practically essential where large numbers of stock are to be reared.

Fibre includes the least digestible of foods, such as the outer cells of grains and fibrous matter in plants. Excessive quantities of fibre are to be avoided, as they are not only indigestible by poultry but when extensively fed, especially in young stock, irritate the intestines.

Grit and Charcoal.—Grit hard and flinty should be supplied to poultry for the purpose of forming the teeth. Shell grit materially assists the mineral supply necessary for the formation of the shell, and charcoal is an excellent regulator for the bowels, fowls consuming it freely.

Digestibility of Foods.—The chemical composition of a food does not indicate its digestibility, and as regards poultry little is known on the subject. It is a question that can only be definitely ascertained by feeding experiments conducted with poultry.

Palatability of Food.—Results are not obtained by making up a ration with definite proportions of the constituents already referred to unless the fowls will eat it. If they become hungry enough they will consume a sufficient quantity of almost any food, but it will be at the cost of a very much reduced egg yield. Upon analysis, barley is found to be a food carrying almost the right quantities of protein and carbohydrate essential for egg production, but when put into practice we find that fowls do not relish the grain, and they have to be gradually accustomed to consume it. It may be as well here to mention that in making any change in the ration to laying stock, do so gradually, as sudden changes in the diet cause a reduced egg yield and frequently a false moult.

Nutritive Ratio.—It has been found by experiment that fowls should eat quantities of digestible protein and carbohydrate in fairly definite proportions. These proportions vary between 1 part of protein to 4.5 to 5 parts of carbohydrate. Experiments conducted in Victoria show the carbohydrates as being greater than these figures, but from the writer's experience a ration of 1 to 5 is sufficiently wide.

To enable readers to test for themselves the ratio of the foods they are using, those consumed by the birds during the last Mount Gravatt competition is given as an illustration. The first column shows the total weight in pounds of food, the second

the total protein content, the third the carbohydrates, and the fourth fats and oils. The costs of the various foods used is given also.

To obtain the content of the various constituents, the weight of the food is multiplied by the percentage shown in the table of analysis. The total protein content is then divided into the totals of the carbohydrates and fats, after the latter have been multiplied by 2.25 to show their carbohydrate equivalent, as a pound of fat will create as much energy as 2.25 lb. of carbohydrates.

Although the ration used in this test was slightly narrow or carried rather too much protein, good results were obtained, owing to the exercise promoted by feeding grain in litter. In the present test slightly more maize is being used, and is giving equal if not better results, and incidentally reducing the cost of feeding.

Table of Food Consumed by 270 Birds, Mount Gravatt Competition, 1924-25.

Kind of Food.	Weight in Lb.	Protein.	Carbo- hydrates.	Oils and Fats.	Cost.
					£ s. d.
Wheat	9,114	1,075.45	4,921.56	136.71	47 18 7
Maize	5,382	538.20	3,293.78	254.95	18 3 1
Bran	3,390	372.90	152.55	61.02	12 19 2
Pollard	8,760	1,217.00	4,117.20	420.48	36 14 11
Lucerne Meal	1,202	133.42	152.65	16.82	7 9 2
Linseed Meal	75	22.50	21.15	2.40	0 9 3
Meat Meal	900	342.00	..	72.00	9 19 3
Charcoal	7*	..	..	..	2 1 0
Shell Grit	1,680	..	..	..	6 13 2
Salt	20	..	..	..	0 4 2
		3,702.17	12,658.89	965.35	142 11 9

* Bags.

$$\text{Ratio} = 965 (\text{fats}) \times 2.25 + 12658 (\text{carbohydrates}) \div 3702 (\text{protein}) = 1 \text{ to } 4$$

Note.—The meat meal used was low in protein and contained salt, which accounts for the small quantity of salt used. Average cost of feed per bird, 10s. 6.7d. Average number of eggs laid, 204 per bird. It will also be observed that pound for pound the consumption of grain and meal is fairly equal.

Commercial Available Feeds and how they should be Used.

Barley.—Not a popular food among poultry keepers nor do fowls consume it readily. It has a fair feeding value, but in order to increase its palatability it should be soaked or sproated. When corn and wheat are high in price, barley could be used to the extent of 50 per cent. of the grain mixture, but, as previously pointed out, the change over should be gradual.

Beans and Peas.—When whole, stock do not take kindly to either of these grains, crushed they add to the protein content of the mash, and may be used to the extent of 20 per cent.

The Grain Sorghum.—In the drier areas this crop can be grown successfully when maize or wheat are failures. They are slightly higher in protein content than maize, but do not contain the fats. Feteriata and Milo are preferred, and are extensively used by some breeders with a good deal of success and economy in feeding. Some varieties of the grain, notably Kaffir corn, are credited with a binding nature on the bowels, but as an offset against this plentiful supplies of green feed can be used.

Maize.—This is one of Queensland's staple grain crops of which poultry are very fond. Large grain needs to be cracked, but the smaller varieties can be fed whole. When purchasing maize for grain feeding, it is as well to try and secure the small whole grain. The quality is then easily judged, and there is no waste. Cracked grain should always be sieved before being used, and the fine powder used in the mash. If the grain is fed extensively, it is inclined to lay on internal fat, but it can be used to the extent of at least 50 per cent. of the grain ration with safety. Yellow corn should be used in preference to the white on account of its content of vitamine A.

Oats.—In some places oats is one of the principal poultry foods. The majority of Queensland's supply is, however, imported, and it therefore cannot be economically used. It is, however, desirable to add variety to the ration of breeding stock by using a proportion of this grain.

Rice.—In the northern portion of Queensland, where this grain is grown, it may be possible to use quantities of this grain. It is a very starchy food of a fattening nature, but can be used to the extent of one-third of the grain ration. Crushed or ground rice needs to be used with care, owing to its habit of going rancid.

Wheat.—This grain provides the bulk of our poultry food supplied. It is readily consumed by poultry, and can be fed as a part of any grain ration or used by itself, the market price of various grain foods available being the guide as to the quantities used. Plump wheats of a hard nature are of better feeding value than pinched grain or full soft grains. It is a better feed for growing stock than maize, having more protein and ash, but for laying stock certain quantities of maize should be used in conjunction with this grain to give colour to the egg yolk.

Bran.—Bran is rich in protein and mineral matter, but carries a fair quantity of fibre. This fibre is useful in adding a certain quantity of bulk to the ration. It also assists in making a mash when fed wet of a nice consistency. Use at the rate of 25 to 30 per cent. of the mash.

Pollard.—Pollard has a greater proportion of carbohydrates than bran, but not so much ash and fibre. It forms the principal constituent of mashes, and may be used to the extent of 60 per cent. of the total mash supply.

Maize Meal.—This feed is especially of value in fattening poultry. Certain quantities may be used in all mashes, but owing to its low protein and ash content it is more suited to the use of adult than young stock.

Ground Oats and Rolled Oats and Hulled Oats.—Ground oats—that is, oats without the hulls—is an excellent food for both laying and growing stock, being rich in protein. Rolled oats may form the sole feed of baby chickens for the first two days, while hulled oats can be fed extensively as a grain. The use of these foods is largely governed by the price.

Linseed Meal.—Fairly rich in oils and proteins, but contains a good deal of fibre. It may be used to the extent of 5 per cent. in the laying mash, and increased slightly during the moulting periods to assist in the growth of feather.

Cotton Seed Meal.—Cotton seed meal, on analysis, would appear to be a splendid food for poultry, but in practice the extensive use has not given good results. A good grade may be used to the extent of 5 per cent., but never exceed this quantity.

Peanut Meal.—A very nitrogenous and easily digested meal. The keeping quality of the food is poor, being inclined to go rancid, but it may be used to assist in building up the protein content of mashes.

Meat Meals.—Meat meals vary considerably in their analysis. They are essential for high egg production. The quantities to be used would vary according to conditions under which poultry are kept. In closed runs where no other class of animal food is available, they may be used to the extent of 10 per cent., but with stock on free range during periods when animal food in the form of insect life is plentiful, the quantity should be considerably reduced.

Dry Crushed Bone and Bone Meal.—This class of food contains fair quantities of protein, but its principal value is its ash content. It is essential for the development of the boney structure of young growing stock and beneficial to laying birds. Amounts up to 5 per cent. may be used. Bone meal having a fairly high protein content, when it is being used other classes of animal food need to be considerably reduced. Poultry keepers who are a distance from markets could burn any bones about the place, which renders them easily crushed, and so have a supply of mineral matter suitable to the feeding to young growing stock.

Milk.—If all poultry keepers had a good supply of skim milk or butter milk there would not be such a large number of poorly developed stock on our farms. There is no better animal food for stock than milk or milk products. In a sour state it is recommended by some authorities as preventative of diarrhœa and coccidiosis. In feeding, however, vessels need to be kept clean, and although the milk is being fed in a sour state, putrefaction needs to be avoided.

Dried Butter Milk.—This is an excellent food for those who have not the fresh product, and in a State such as Queensland, where the dairying industry is so extensive, poultry breeders should be assured of a continuity of supplies. Milk and milk products appear to be a tonic as well as a food, and highly suited for laying stock, growing stock, and breeding stock. When used for the latter purposes, it has been the writer's experience that the hatch-ability of the eggs have been increased. It may be used for the sole source of animal food supplied, or used in conjunction with other forms of animal foods. The price will govern its use, but there is apparently no advantage in feeding greater quantities than 10 per cent.

Green Feed.—Some sort of succulent green food is essential to maintain the health and vigour of stock, not so much by reason of its nutritive value, although certain quantities are supplied, but to act as a natural tonic on the fowl's system.

It has long been recognised as an important food for poultry, but it is only during recent years that scientists have found that green foods have been supplying an element known as "vitamine," which is essential to life. Green feed stimulates the liver and increases the secretion of digestive juices. The kinds of green feed most valuable and relished by fowls are the young, tender-growing portions of lucerne, lettuce, kale, rape, silver beet, barley, oats, maize, &c. In fact, all green foods are good, but it needs to be young or tender. The quantities used is dependent upon supplies and general conditions. When feeding by itself, say, at midday, give the birds as much as they will eat. If used in a wet mash, the quantity could be as high as 25 per cent. of the bulk, and during drougthy periods, when poultry foods are costly, green feed can be used to the extent of 60 per cent. of the mash; but when fed in these quantities, two mashes, one at 7 a.m. and one about 1 p.m., should be fed daily, followed by a grain feed, say, at 5 p.m. Poultry have not a great holding capacity, hence the necessity of feeding two mashes to enable them to deal with the necessary bulk to obtain all the nutriment required.

When fresh green feed cannot be obtained, lucerne chaff, dust, or meal make an excellent substitute. This class of food, being dry, however, cannot be used to the same extent as if green. By weight, 12 per cent. should be the limit. If feeding on the wet mash, the dry lucerne can be soaked over-night with just enough water to mix the mash. This softens the lucerne, making it more easily digested.

Grits.—Shell and limestone, &c., for the purpose of supplying the necessary lime for bone and egg shell, material such as sea shell, crushed limestone, and ground bone are supplied. Good supplies of oyster shell or ground lime should always be available, while bone may be supplied either in the form of meal or grit.

Hard Flinty Grit.—Hard pieces of rock, crockery, sand, &c., are necessary to poultry for the grinding of their food supplies. The size naturally varies with the age and size of the birds. This should also be in free supply, particularly with stock confined to pens. Without grit it is impossible for stock to thoroughly digest their food, and any system of feeding where this is not supplied is wasteful.

Charcoal.—This can be fed either in the mash or be available to stock at all times. When it is desired to feed powdered charcoal in the mash it should be used at the rate of $2\frac{1}{2}$ per cent. The principles for using charcoal are for its mineral content and its action as a bowel corrector.

In feeding all grit continuity of supply is essential, otherwise stock are liable to gorge themselves, with resulting troubles in the nature of distended crops, &c.

Salt.—With a good system of feeding—that is, variety and plenty of green feed—there is generally a sufficient supply of salt to meet the body requirements, but small quantities, 8 oz. to every 100 lb. of mash, makes the food more palatable, with the result of greater consumption and production. Salt, however, needs to be well mixed with the mash; when wet mash is fed it can be dissolved in the water, but when fed dry too much care cannot be exercised in thoroughly distributing it throughout the mash, owing to its poisonous nature when excessive quantities are consumed by poultry.

From the foregoing the nature and uses of food generally available in Queensland for poultry can be gathered, and it is now only necessary to deal with the methods of feeding.

Feeding of Laying Stock.

There are two methods of feeding in common use—wet mash and grain and dry mash and grain, good results being obtained by both. Liberal quantities of green feed are given in each method. It is a difficult matter to say which is the better of the two, but to the general poultry keeper, more especially the man with little

time, and the novice, the use of dry mash is recommended. By this system a considerable saving in labour is made and the birds get a full supply of what should be a well-balanced ration. It is impossible for the birds to swallow mash dry; therefore, it should stimulate the secretion of saliva and aid digestion. Wet mash feeding, however, has its advantages, in so far that large quantities of succulent green feed can be used, and, where available, the mash can be mixed with milk. The feeder needs to be particularly careful to see that his birds have full and plenty, but should not leave food lying around to become fouled and sour.

Suitable mash mixture: Bran, 25 per cent.; pollard, 55 per cent.; lucerne meal or dust, 12 per cent.; meat meal, 5 to 10 per cent.; salt, 12 oz. to every 100 lb. of dry feed.

This mixture is that which was used in the egg-laying competition at Mount Gravatt, and it gave good results with a mixture of wheat and maize at night. The feed used throughout the test of the whole twelve months had a nutritive ratio of 1 part protein to 4 parts carbohydrates. If dry mash is being fed, this mixture can be mixed in bulk and fed in gravitating hoppers to guard against waste. If it is desired to feed wet mash, the lucerne dust or meal may be replaced with green feed and may be increased to 25 per cent. of the bulk, or in droughty time when feed is dear more green stuff may be used. When liberal supplies of milk are available the addition of meat meal is not necessary.

This is not the only ration that can be used for laying birds, but under normal conditions it would be difficult to get one more convenient. Many feeding tests have been carried out by the Department of Agriculture in Victoria, and it is thought desirable to state what some of these rations were and the results obtained. These rations could be taken as a rough guide for Queensland conditions, and possibly some of the grains shown could be used by local poultry breeders at times with advantage.

Cereal Test.

In this test a wet mash was made up of equal parts by measure of bran, pollard, and green feed. The bran was moistened with soup made from boiled table scraps, sheeps' heads and livers, or else meat meal, and dried off with pollard to a nice crumbly condition, when the green feed was added. This mash was fed to four different lots of hens, which were as alike as it is possible to get birds, in the morning. Each pen, however, was fed with a different grain at night. The grains used were Algerian feed oats (not clipped), wheat, barley, and a mixture of 2 parts wheat, 1 oats, and 1 barley.

SUMMARY OF TEST—EGG YIELD AND FEED COST.

	Average Per Bird.	Average Price per dozen when Eggs were Laid.		Return per Bird.	Cost of Feed.						Profit over cost of Feed.		
					Mash.		Grain.		Total.				
	Eggs.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Pen 1 (Oats) ..	170	1	8	23	7 $\frac{1}{3}$	3	1 $\frac{3}{4}$	3	9 $\frac{1}{4}$	6	11	16	8
„ 2 (Wheat)	150	1	8	20	10 $\frac{5}{6}$	2	8 $\frac{3}{4}$	6	7 $\frac{2}{3}$	9	4 $\frac{2}{5}$	11	6 $\frac{3}{5}$
„ 3 (Barley)	144	1	8 $\frac{2}{3}$	20	9 $\frac{2}{3}$	2	7 $\frac{1}{2}$	3	3 $\frac{1}{2}$	5	10 $\frac{1}{5}$	14	10 $\frac{1}{5}$
„ 4 (Mixed Grain)	157	1	7 $\frac{1}{3}$	21	1 $\frac{2}{3}$	2	5 $\frac{7}{8}$	4	6 $\frac{1}{4}$	7	0 $\frac{1}{8}$	14	1 $\frac{1}{2}$

From the test it will be seen that the Algerian oats fed pen showed the greatest score and profit per bird, and that this grain is satisfactory as a food; also that barley, a food not popular among poultry keepers, gives fair results. The yield from barley feeding is not so high, but the reduced cost of feeding, by its utilisation, warrants consideration being given to this food during times of scarcity.

Maize Feeding Experiments.

Extensive feeding of maize has been roundly condemned, but the results from the experiment discounts to a large extent arguments against its use. In this test thirty-six birds equal to those in breeding of those in the cereal test were used. They were housed and treated under similar conditions with the exception of the ration. This test also was carried out over a period of twelve months. The birds were fed on a dry mash in hoppers consisting of:—Maize meal, 33 lb.; bran, 33 lb.; pollard, 33 lb.; meat, 10 lb.; powdered charcoal, 3 lb.

The grain ration which was fed in litter consisted of 3 parts crushed maize and 1 part wheat. Green feed was fed mid-day.

SUMMARY OF TEST—EGG YIELD AND FEED COST.

Average number of Eggs per Bird.	Return per Bird.	Cost of Feed.			Profit over Cost of Feed.
		Mash.	Grain.	Total.	
	£ s. d.	s. d.	s. d.	s. d.	s. d.
156	1 1 4	3 3-6	5 6-5	8 10-1	12 6

The result of the test compares more than favourably with the cereal test in connection with the number of eggs. In the test maize cost 6s. per bushel, maize meal being slightly higher. With maize at about 4s. per bushel, profit over cost would have been materially effected.

Another test of interest is meat meal *versus* dried butter milk. In the test 120 birds of equal breeding were divided into two pens. Both pens were fed with a dry mash, with this difference—that for one pen the animal food was dried meat meal, while dried butter milk was used for the other.

SUMMARY.

Pen.	Average Number of Eggs per Bird.	Return per Bird.	Food Cost per Bird.	Profit over Cost of Feed.
		£ s. d.	s. d.	£ s. d.
60 Birds (Dried Buttermilk)	211-46	1 9 7½	7 11½	1 1 8
60 Birds (Dried Meat Meal)	174-73	1 4 0	7 0½	0 16 11½

It was noted that the pen fed on butter milk powder consumed more food. This naturally was responsible for an increased egg production. The reason advanced for the increased consumption of mash was that the milk added to the palatability of the ration. The extra cost of feeding amounted to £2 15s. 1d., but as the milk-fed pen returned £16 14s. 6d. more in the form of eggs the expense was well warranted.

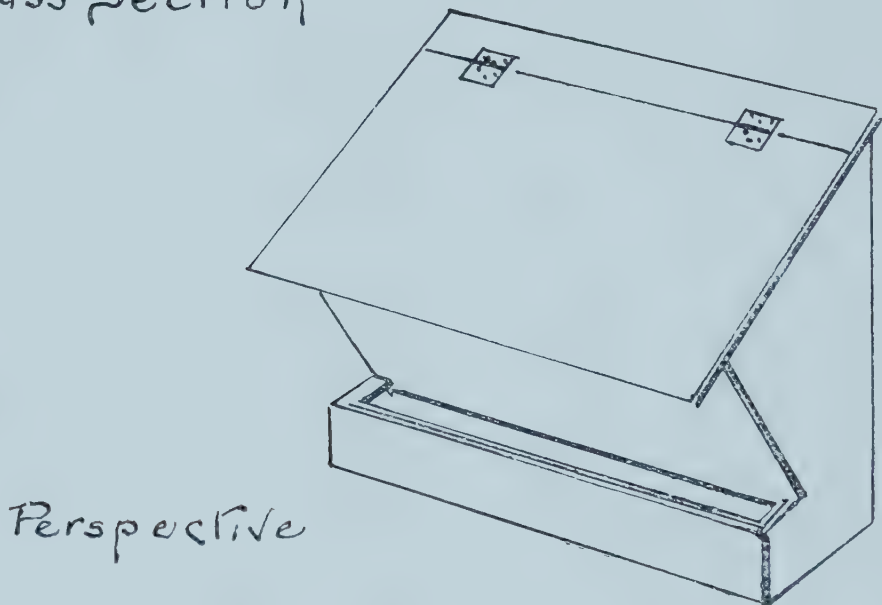
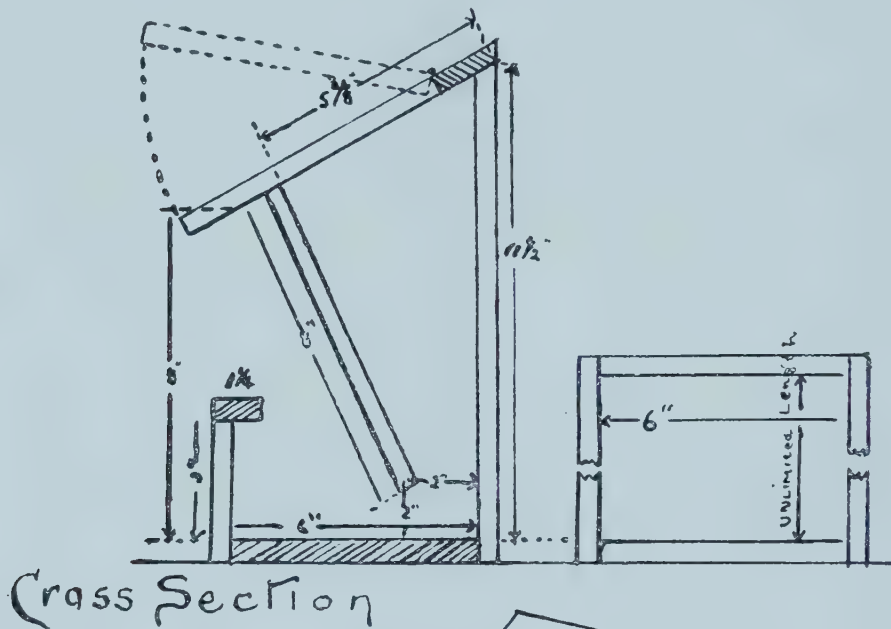
The rations being used in some of the California egg-laying contests for the year 1922 should also be of interest to the feeder for egg production.

Grain.	Santa Cruz.	Petalumia.	Pomona.
	Per cent.	Per cent.	Per cent.
Barley	40-0	35-3	30-0
Wheat	22-5	33-3	20-0
Milo .. ..	..	..	20-0
Cracked Corn ..	37-5	32-3	30-0
	100-0	100-0	100-0
Mash.			
Bran	30-0	29-7	35-0
Middlings	20-0	16-7	..
Red Dog Flour ..	..	..	20-0
Ground Barley ..	..	11-2	..
Ground Oats	12-5	..	..
Corn Meal	12-5	24-0	20-0
Soybean Meal	5-0	..	..
Linseed Meal	5-0	..	10-0
Meat Scrap	7-5	9-2	7-5
Fish Scrap	7-5	9-2	7-5
	100-0	100-0	100-0

In these tests grain and mash are fed as nearly as possible in equal quantities.

DRY MASH HOPPER.

The accompanying sketch and cross section of a wall hopper—that is, a hopper to be hung or placed against the walls of poultry houses—will enable breeders to manufacture hoppers suitable for their requirements. As will be seen, the hopper can be made to any length, likewise it is possible to increase its height. The dimensions could be governed by the timber available and numbers of birds to be fed.



If it is desired to build hoppers to be placed out in the runs, the cross section can be taken as half of the hopper, and provision, therefore, made for the stock to feed from either side. Protection from the weather can be provided for by having a sheet of iron of suitable length bent to fit the top of the hopper. This iron cover should also have sufficient overhang to shed the water clear of the feeding trough. Many types of hoppers can be manufactured both from wood or iron, the kerosene-tin being particularly adaptable to the purpose, but hoppers built upon the above lines are, perhaps, the easiest of manufacture.

QUEENSLAND'S MAGNETIC NORTH.

The visit of the Empire Parliamentary Delegation to Queensland was one of the big events of the month. The visiting Parliamentarians, representative of almost every Assembly in the British Commonwealth, have expressed themselves as profoundly impressed with the agricultural conditions and prospects in this State, particularly in respect to the wonderful wealth, both latent and the process of winning, of our Northern tropical province. The leader of the delegation, the Marquis of Salisbury, made this clear in the course of an address at a public function at Yungaburra on the Atherton Tableland. The delegates, he said, had not formed very clear ideas as yet on all the problems of Australia, which was a bewildering place, and he had been warmly impressed with the wonderful resources of this great country of Queensland. Travelling from the temperate climate of New South Wales to the highly tropical vegetation of Cairns, one rose up 2,000 ft. and found himself once more in a temperate climate. He was deeply interested in the resources of this wonderful country. A great responsibility rested upon Australians, who had been given by Providence a country second to none. They had been given a wonderful opportunity. The British were the most wonderful colonising race that the earth had ever seen. It was for the Australians to make good. They had done extremely well, but there was a great deal yet left to be done. He sincerely hoped that if nothing less resulted from the present journey there would be this—that henceforth there would be a better understanding between the peoples of Great Britain and the people of Australia. The delegation would take away the news that North Queensland was a wonderfully fertile land, and that all it required was population. The speaker did not require to be convinced of the value of the climate at Atherton, and he was sure that it would produce a healthy, vigorous race.

The Great Future of the North.

“I am convinced that this district has a very great future,” said the Rt. Hon. J. Ian McPherson, another member of the delegation, when speaking of the richness of Cairns and its environs. It was wholly distinctive, he said, from anything else they had seen in Australia, and the land could, he felt, grow practically anything. What was important also was that the people who lived here knew the possibilities of the place, and he could say that he had been very impressed with it.

Another notable visitor to Queensland in the course of the month was the Hon. W. G. Gibson, Postmaster-General of the Commonwealth, who was greatly impressed with Queensland and its scenic loveliness.

“The rising generation in towns like Mackay, Rockhampton, Cairns, and Townsville compare very favourably with any children in the South,” Mr. Gibson said to the Brisbane Press. “The type of man who has spent his lifetime in Western Queensland is really an outstanding type, seen seldom anywhere except in a country of vast spaces like Queensland.”

Outstanding Manhood.

“There is some of the finest scenery between Cairns and Kuranda that I have seen anywhere in the world. There is an impression among a lot of people in the Southern States that North Queensland is not a white man's country, but one could not form any impression other than that the rising generation in towns like Mackay, Rockhampton, Cairns, and Townsville compare very favourably with any children in the South, and older men who have lived their lifetime in the North seem so tied up in the country that, even if they were to retire, they would not spend their latter days in the climate of the South, but somewhere in the north of Queensland. I had the advantage of seeing many men at the Townsville Show from out Western Queensland, and the type of man who has spent his lifetime in that country is really an outstanding type, seen seldom anywhere excepting in a country of vast spaces like Queensland.” These men were going through abnormally trying times on account of a season of scanty rainfall, but they had so much confidence in their own territory that nothing would induce them to leave a country that had its periodical dry periods, because it had its compensations in so many good years. He was sure that, if Southern people knew of the climate and scenery of North Queensland and its tableland, there would be streams of tourists coming in the winter months from the Southern States to enjoy the mild climate and conditions that applied to a tropical area such as obtained in the coastal country of the North.

Wonderful Productivity.

Mr. Gibson explained that one of his principal missions to Queensland had been to speak on the referendum proposals, and at the various towns from Bundaberg north he had had very good receptions and audiences. His tours also had given him,

as a Southerner, a better grasp of the sugar position, and what it meant to the State of Queensland. "I was astounded," said Mr. Gibson, "at the productivity of the country, with its very fine rainfall and beautiful alluvial flats and volcanic soils. Should such a disaster as the failure of the sugar embargo take place, one can hardly imagine the desolation it would create in these areas, where such fine cities have been built solely on the sugar industry.

Conservative Farming Notions.

Mr. Gibson observed that a striking feature associated with sugar cultivation was that the whole of the sugar farmers confined themselves solely to the production of sugar, and made no effort whatever to add to their farming any second industry, but were content to purchase the actual feed for their horses from other areas, rather than grow corn to supply their own needs. "Surely," Mr. Gibson queried, "dairying and the growing of corn and perhaps the pig industry might very profitably be added to the sugar industry as we now know it."

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST 1926 AND 1925, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Aug.	No. of Years' Records.	Aug., 1926.	Aug., 1925.		Aug.	No. of Years' Records.	Aug., 1926.	Aug., 1925.
<i>North Coast.</i>	In.		In.	In.	<i>South Coast—continued:</i>	In.		In.	In.
Atherton ...	0·87	25	0·64	1·73	Nambour ...	2·03	30	0·10	4·22
Cairns ...	1·80	44	1·65	1·92	Nanango ...	1·43	44	0·26	2·44
Cardwell ...	1·32	52	1·37	0·85	Rockhampton ...	1·03	39	0·08	1·41
Cooktown ...	1·35	50	0·50	1·73	Woodford ...	1·85	39	0·18	3·18
Herberton ...	0·68	39	0·31	0·70					
Ingham ...	1·56	34	1·80	1·96					
Innisfail ...	5·23	45	5·40	4·98					
Mossman ...	1·50	13	0·90	0·58					
Townsville ...	0·56	55	0·02	1·98					
					<i>Darling Downs.</i>				
<i>Central Coast.</i>					Dalby ...	1·27	56	0·29	3·32
Ayr ...	0·65	39	0	0·85	Emu Vale ...	1·27	30	0·33	2·98
Bowen ...	0·71	55	0·07	0·83	Jimbour ...	1·30	38	0·13	0·93
Charters Towers ...	0·63	44	0	1·06	Miles ...	1·24	41	0·44	3·66
Mackay ...	1·12	55	0·18	4·66	Stanthorpe ...	1·89	53	1·45	4·98
Proserpine ...	1·52	23	0·46	2·93	Toowoomba ...	1·76	54	0·35	3·08
St. Lawrence ...	0·90	55	0	1·46	Warwick ...	1·59	61	0·42	3·79
<i>South Coast.</i>					<i>Maranoa.</i>				
Biggenden ...	1·15	27	0·12	1·48	Roma ...	1·02	52	0·18	2·05
Bundaberg ...	1·35	43	0	1·02					
Brisbane ...	2·10	75	0·41	3·14	<i>State Farms, &c.</i>				
Childers ...	1·30	31	0	1·21	Bungeworogorai ...	1·11	12	0·01	1·38
Crohamhurst ...	2·32	30	0·14	5·54	Gatton College ...	1·27	27	0·49	0
Esk ...	1·61	39	0·93	3·15	Gindie ...	0·79	27	0	0
Gayndah ...	1·23	55	0·06	1·21	Hermitage ...	1·48	20	0·28	3·26
Gympie ...	1·82	56	0	1·63	Kairi ...	1·05	12	0·59	1·18
Caboolture ...	1·63	39	0·72	3·19	Sugar Experiment Station, Mackay	1·04	29	0·28	3·93
Kilkivan ...	1·53	47	0·10	1·34	Warren ...	0·99	12	0	1·46
Maryborough ...	1·75	54	0·04	1·60					

NOTE.—The averages have been compiled from official data during the periods indicated; but the reports for August this year, and for the same period of 1925, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Meteorologist.

EFFICIENCY IN DAIRY PRODUCTION.

WHAT THE DEPARTMENT IS DOING.

The Minister for Agriculture (Hon. W. Forgan Smith), referring in the course of a recent Press announcement to the conclusions of the Imperial Economic Committee, which urged Empire dependents on the dairying industry to adopt more efficient methods in production, said that the Committee in its report indicated several directions in which improvement in existing conditions might be effected. Generally, the recommendations of the Committee are in harmony with the policy that had been adopted by his department. Fodder conservation was mentioned, and in this connection Mr. Smith stated that the growing of crops suitable for dairying purposes had been, and was, receiving attention, and much had been done to encourage dairy farmers to give attention to the important matter of fodder conservation. Instruction in all matters relative to the growing of the crop and the conservation of fodder was being given by officers of the department, and, through the Agricultural Bank, assistance was afforded to farmers desiring to construct silos or sheds for the storage of fodder. Practical assistance in the improvement of dairy herds had been provided in the form of a subsidy which was paid to approved dairy farmers desirous of purchasing a pure-bred bull—i.e., the progeny of an approved sire and officially tested dam. The systematic testing of milch cows by officers of the department had been carried out over a number of years. This branch of departmental activities was growing in favour among dairy farmers, and in the course of the last five years about 80,000 cows had been submitted to test. This work was carried out free of cost to dairy farmers.

Pasture Improvement.

Pasture improvement had been carefully considered, and experimental plots had been established in various districts, and the increased tonnage of pasture that had followed in the wake of ploughing, or an addition of fertilisers to the soil, had been carefully recorded and published, with a view of encouraging dairy farmers to give greater attention to pasture renovation.

Market Regulation.

These activities he especially referred to because they were matters emphasised by the Imperial Economic Committee as being worthy of consideration by dairymen throughout the British Dominions. The Committee also mentioned the matter of regulation of supplies in order that much of the "peak" difficulties might be removed in the marketing of dairy products abroad. The Committee had suggested, he continued, that marketing of dairy produce should be more scientifically regulated, and it recommended the holding in cold storage of produce at the seasons of highest production, thereby obviating the simultaneous arrival on the London market of excessively large quantities of dairy foodstuffs. Here again the Government, by the erection of a cold stores at Hamilton, had rendered practicable this recommendation of the Committee. Ample cold storage accommodation for primary products had been arranged at Hamilton, on the Brisbane River, and the facilities they are afforded for the loading of chilled products from the cold store to the ship's hold are the means of avoiding fluctuation of temperatures.

Attached to the department was a staff of instructors and inspectors who worked for the betterment of the industry, and had the support and assistance of the Agricultural Chemist to carry out necessary analytical work, while the bacteriological investigations had the attention of the Government Bacteriologist.

CONTAGIOUS MAMMITIS IN CATTLE.

Several inquiries for information on vaccine treatment for contagious mammitis which has proved very successful in Queensland have recently been received. The vaccine is prepared by the Government Bacteriologist, Stock Experiment Station, Yeerongpilly, and is supplied to stockowners at 5s. for sufficient vaccine to treat one animal. The Government Bacteriologist, Mr. C. Pound, has supplied the subjoined note on contagious mammitis, which is of general interest to dairymen.

This serious disease is continually being brought under notice through outbreaks occurring on dairy farms. The spread of the disease may be attributed partly to the carelessness of the dairy farmer, and to the want of proper hygienic methods of controlling it.

The disease is caused by a tiny chain-forming micro-organism, or streptococcus, which attacks the mucous membrane, and, through the development of its poisonous products or toxins, causes the rapid destruction of tissue cells and leucocytes or

Symptoms.

It will be observed in some cases that the symptoms are so slight that the milk does not appear to be curdled, and, on settling, the deposit is so small as to be overlooked.

Undoubtedly the transmission of the infection from one cow to another is through the agency of the milker's hands or the cups of the milking machine. This appliance, which was designed to enable the farmer to produce cleaner milk than by any other method, must be kept scrupulously clean and be sterilised after each milking, and this advice is applicable also to the milker's hands; moreover, all cows that are considered in any way suspicious should be milked last.

Milk from an affected cow must be considered dangerous. The cow should be milked into a vessel kept for the purpose, and the milk scalded so as to destroy the mammitis germs. When the milk is cooled down it may be fed to the pigs.

Both preventive and curative treatment have been carried out successfully by means of vaccine prepared at the Stock Experiment Station, Yeerongpilly.

The vaccine is injected into the subcutaneous tissue behind the shoulder in the same manner as tick fever inoculation is performed, and the ordinary tick fever syringe and needle are necessary to perform the work.

Animals.								Cost.
								<i>£ s. d.</i>
1	0 5 0
4	0 15 0
10	1 10 0
20	2 10 0
30	3 0 0
40	3 10 0
50	4 0 0
60	4 10 0
70	5 0 0
80	5 10 0
90	6 10 0
100	7 10 0

THE DUROC-JERSEY PIG.

By E. J. SHELTON, H.D.A., Instructor in Pig Raising.

In recent years three new breeds of pigs have been introduced into Australia, two of them, at any rate, entirely new to our conditions; the other practically a new breed, judging by its improved quality and up-to-date type. We refer in the first instance to the most recent American introduction, the red hog of America, the Duroc-Jersey, and also to the Gloucester Old Spot breed, a black and white spotted type, a British breed with a good reputation and coming from a country where they have been handled for a century or more in the partly improved and improved form. The other breed to which reference is made is the type originally known as the British Large Black, or, as it is sometimes referred to by the old hands, the Devon breed, but now popularly and more frequently spoken of as the Large Black, a breed emanating from county Devonshire, in the British Isles.

Of these three new breeds the Duroc-Jersey certainly appears to be making the most rapid headway here in Queensland, while the Gloucester Old Spot and Large Black have forged ahead in Victoria, a State in which as yet the Duroc-Jersey is not well known. With us the Duroc (as it is frequently referred to) certainly has had the advantage of a year or two's publicity ahead of either of the other types, though it must be said in their favour that even under these conditions they have established themselves fairly well even in face of the rather severe competition of the older and more widely distributed breeds. The Large Black was very popular here some years ago, but, as was also the case in the other States, it failed as a breed to make headway, and now one would scarcely find a pure-bred Large Black in the whole of this vast expanse of country, though, doubtless, they will become popular again in due course.

The principal qualifications of the Duroc-Jersey as we have them here are their early maturity and their adaptability, they being suited either in the pure or cross bred state to the requirements of both pork and bacon producer. Whether, from the factory and from the consumer's point of view, they will be able permanently to justify their overseas reputation remains to be seen. They appear to the inexperienced eye to be somewhat heavy boned and coarse, some strains particularly appearing much less refined than others; they are also variable in colour, some being a light-yellowish red, other quite a dark-brown shade; some have comparatively straight soft and silky hair, while others have what appears to be coarse curly hair. All these imperfections, however, are commonly associated with new breeds that have been developed under American conditions, where the general demand is for a much heavier animal and for an animal carrying a much larger proportion of fat than is popular here in Queensland. These are largely faults which could be overcome or improved upon by careful selection, efficient housing and management, and possibly by a system of breeding aiming at earlier maturity and at refinement in the general character both of the flesh, bone, and external covering. Those breeders here who have given the Duroc-Jersey a thorough "test out" have a good deal to say in their favour, though so far experiments have not been extensive or continuous enough to be able to definitely acclaim from the data available that the Duroc-Jersey or its crosses are superior to the Tamworth-Berkshire, or even the Tamworth-Poland-China or Yorkshire-Berkshire crosses.

Certain it is that splendid opportunity offers for fanciers of the Duroc to come forward in carcass contests—if these can be arranged—and at live stock exhibitions generally with exhibits of the most popular strains, for after all more can be done to advertise a new breed by actual demonstration at the pig pens on the farm and in the show-ring than by newspaper publicity. The bacon factory folks also have a say in these matters, and their reports will be eagerly looked forward to as time goes on.

If the breed can in this way as well as on the farm prove their superiority over other breeds, it will need no better advertisement in the bid for popularity among those engaged in pig production. Meantime we strongly recommend breeders who are interested to carefully study the breed and its varied qualifications, and to take



PLATE 77 (Fig. No. 2).—DUROC-JERSEY SOW, "MISS SPECIAL SENSATION."

Junior Championship Winner at Kansas and Oklahoma State Fairs, U.S.A. This picture was taken when the sow was one year old. She is, according to the American idea of the type, practically perfect, well balanced, high-backed.



PLATE 78 (Fig. No. 1).—DUROC-JERSEY BOAR, "BERRYTON'S SENSATION."

Grand Champion Duroc-Jersey Boar, Kansas State Fair, U.S.A., 1924. An attractive upstanding sire of good type and quality.

every opportunity of getting in touch with those who have actually given the breed a fair trial. The breeders advertising Duroc-Jerseys for sale in the several agricultural newspapers and journals, and in the Australian Stud Pig Breeders' illustrated pamphlet, "Better Pigs on Every Farm," will be only too pleased to supply quotations and to give any information in connection with their experience of the Duroc. By the way, copies of the publication, "Better Pigs on Every Farm," may be obtained gratis on application to the Secretary of the Queensland Branch of the Australian Stud Pig Breeders' Society (Mr. R. G. Watson, Inns of Court, Adelaide street, Brisbane), while the series of illustrated pamphlets on matters pertaining to pig raising generally may be obtained on application to the Department of Agriculture and Stock, Brisbane.

It is worth at this stage mentioning the experience of a number of breeders interested in the Duroc. In the other States, for instance, Mr. W. H. Bruce, of South Australia, probably the largest pig-raiser in that State, has during the past two years "switched over" on to the Duroc-Jersey as undoubtedly the most prolific and most profitable pork and bacon pig, this especially so where Duroc boars are crossed on to Tamworth and Tamworth-Berkshire sows. Mr. Bruce refers to quite a number of instances in which Tamworth sows have farrowed from twelve to fifteen pigs in the litters sired by Duroc-Jersey boars. These are red and black spotted pigs of good type. He is of opinion, as also are many other breeders, that in the pure-bred state the Duroc is inclined to be heavy boned and coarse, but this does not appear pronounced in the cross-bred types referred to. Mr. Bruce was speaking of the product of 150 breeding sows, 90 per cent. of whom were crossed with boars of the Duroc breed—boars, by the way, which he considered were the finest he had ever had on his property. As Mr. Bruce has 500 acres pig fenced, with an additional area of 200 acres in preparation for pig paddocks, his experience must count. He is principally interested in the production of porkers.

In New South Wales Messrs. Whittaker Brothers, of Denison street, Botany, suburban pig farmers carrying 500 head of pigs or more, have recently introduced Duroc-Jersey boars for crossing with sows of various crosses—Tamworth-Berkshire, Berkshire-Yorkshire, &c. Mr. R. Whittaker writing a few days ago, says that the litters that his sows are producing by the Duroc-Jersey boar are easily holding their own with other breeds, though he recognised it would take a long time to thoroughly test out this red hog. Other breeders in New South Wales also have proved the Duroc to be a good pig for cross-breeding purposes for the production of bacon pigs.

In Queensland Messrs. Brown Brothers, of Mooroombin, Toogoolawah, have also had fairly wide experience of the type. It was as a result of a close personal investigation into the merits of the breed while on a visit to America and Canada four or five years ago that Mr. Fred G. Brown, the senior member of the firm of Brown Brothers and an enthusiastic Friesian cattle breeder, decided on the introduction into Australia of some of the famous red hogs of which he heard so much and inspected so many during the trip. He eventually succeeded in introducing the type and, apart from W. H. Bruce, of South Australia, is the only breeder who has thus far made any further introduction.

From their stud Durocs have been forwarded to many parts of Australia.

Another enthusiastic breeder and exhibitor of Durocs is Mr. Percy V. Campbell, of Lawn Hill, Lamington, via Beaudesert. In writing recently in regard to his experience Mr. Campbell states that so popular have the Durocs become that he has effected sales of selected boars and sows to breeders both here in Queensland, in New South Wales, and also in Victoria.

Mr. Campbell's sales include deliveries to Balfe's Creek, via Charters Towers, Queensland, in the Northern Division, to many breeders in the Central Division, including quite a number to the Central and South Burnett, and in Southern Queensland to many centres both on the South Coast and the Fassifern and Brisbane Valley Line, as well as on the main Southern and South-Western Lines and the Darling Downs. He says it is his intention as opportunity offers to dispose of all his other breeding sows and to specialise in the production both of purebred Durocs and of Duroc crosses, for sales of purebred stock have become more numerous and the inquiry is still keen, though during unsatisfactory seasons like the present the demand falls off. Mr. Campbell's experience prior to taking on the Duroc-Jersey was that the Berkshire breed had been, and in many places still is, practically the only breed represented; he realises as many other breeders do also that the Berkshire is a "safe" breed, but he has noted since other breeders have purchased Duroc-Jerseys that many farmers are waking up to the fact that their pigs are not as good as they ought to be, and the introduction of the Duroc-Jersey crosses seems to be acting as it were as a saviour of the position. Never yet, remarked Mr. Campbell, have

I found one farmer who has tried the Duroc who regrets his choice. Many of them report that under the new conditions they are marketing their baconers at an earlier age than they did with the older type Berkshire. He says the factories seem to be well pleased with the pigs as they usually class them as prime. One feature he has found specially noticeable and that is that the Duroc is a good doer, they eat and thrive well and grow fast. As breeding sows Mr. Campbell's experience has been that the Duroc sows are good milkers, rearing good pigs, and as for numbers they



PLATE 79 (Fig. 3).



PLATE 80 (Fig. 4).

Duroc-Jersey Sows with litters, the property of Mr. Percy V. Campbell, of Lawn Hill, Lamington, Q. The photographs indicate the prolific sturdy nature of the breed, a breed new to Queensland conditions, but apparently well suited to the requirements of pig raisers for the production of store, bacon market, and stud pigs.

easily hold their own, some of his sows farrowing ten to twelve good strong pigs. Sows have farrowed up to sixteen pigs in their second litters and they usually rear eight to ten pigs or more each time.

Mr. Campbell submitted a few figures in proof of his assertion that the Duroc is worth a trial. His purchases included—

	£	s.	d.
January, 1924—Duroc Sow, "Mooroombin Miss." Bred to imported Boar, "Mooroombin Sensation"	21	0	0
May, 1924—Duroc-Jersey Boar and Freight	14	10	8
March, 1926—Boar "Taldra Imperial"	15	15	0
March, 1926—Sow "Taldra Regina," in pig to a boar of unrelated strain	21	0	0
Shipping Expenses, Freight, &c., ex Adelaide	10	11	10
	<hr/>		
	£82	17	6

Pigs on hand ex above and others as at 30th June, 1926, totalled fifty-two head.

He estimated his cost of feed, &c., to 30th June, 1926, at £30 2s. 5d., the balance of feed grown on property; there were other incidental expenses also covering registration, &c.

From these foundation stud animals he has effected the following sales:—

	£	s.	d.
Sales from May, 1924, to 30th June, 1925	51	0	0
Sales from 1st July, 1925, to 31st December, 1925	193	7	4
Sales from 1st January, 1926, to 30th June, 1926	65	15	1
	<hr/>		
	£310	2	5

These Mr. Campbell states represent the stud sales and some of the bacon and pork sales, and as indicated above there were on hand as at 30th June, 1926, no fewer than fifty-two head, many of them being prepared for exhibition. Since that date there have been added sales, and the imported "Taldra Regina" has farrowed a dozen fine sturdy youngsters.

Breeders in the Beaudesert district and in the South Burnett have also given the Duroc a very fair test out, a few of those interested being Mr. H. Bruxner, Jelbyn, Beaudesert, Mr. Leo Delroy, Murgon, Messrs. H. Shelton and Sons, Merlwood, Mr. T. A. Bellotti, Ashfield Farm, Murgon, Mr. Hardiker, of Murgon, and many others.

Overseas Experience.

It is noted in the current issue of the English publication "Pigs" that Messrs. Campion Brothers, who own one of the largest hog ranches in Argentina, in giving a report of their experience with various breeds—and they carry upwards of 3,000 breeding sows on their ranch—had this to say: "That the improved type of Duroc-Jersey had come to stay, and to-day they considered them undoubtedly the best pig for the purposes of their ranch. They found from their weighings (and the average of the progeny of 3,000 or more sows provided a good deal of reliable evidence) that the Duroc-Jersey is a much quicker grower when young than the older type of Poland-China, and since they have no desire to hold their market pigs on the ranch one day longer than necessary they found it to their advantage to change over gradually from Poland-China to Duroc-Jersey though they realised the change would cost them a lot of money. They aim at marketing prime baconers at around five months of age and as "Pigs" remarks, judging by the extraordinary uniformity of type and size of pigs illustrated in a number of photographs produced, it would seem that there could not be very much difference between the best and the majority of their pigs. They feed principally on lucerne and maize, barley and wheat products also being used. The lucerne crop, says Mr. Campion, is the basis of the pig industry in the Argentine; it provides practically the whole of the grazing and a fairly large proportion of the food consumed.

Future Prospects.

It would seem therefore that we have in the Duroc-Jersey a type of pig destined to play an important part in the pig industry. Their future is in the hands of the breeders interested, whether they win out or whether they will fail to "fill the bill" remains to be seen. They are well worth a trial, and the more experience and knowledge breeders have of the breed before trying them the better.

Historical Record.

In several interesting and attractively prepared publications issued recently by the National Duroc-Jersey Record Association at Illinois, United States of America, it is stated that more than 40 per cent of the pedigreed pigs in the United States of America are of the Duroc-Jersey breed. The type appears to have been developed from a strain of pig introduced into the United States of America from Spain as far back as the year 1820. These were red or sandy coloured hogs that had the reputation of growing to an enormous size with a good quality flesh. Doubtless during the days of American slavery when ships traded freely with different countries carrying slaves and food supplies, &c., some of the more interested "chiefs" carried with them as "booty" some of these red hogs, for we have authentic record of their having been introduced both from Guinea and New Jersey as well as from Spain. It is presumed that they were introduced by or for breeders who had a fancy for a red hog, for hogs of this colour were well known "way down in Tennessee" and in Saratoga, New York, and were considered to be far superior to the types common in most States, though they were smaller and less profitable than the Spanish type appeared to be. It is possible, too, that descendants of the Old English Berkshire, which were introduced later to improve and develop the Poland-China, may have reverted to a reddish coloured hog, for these old English types were all inclined that way; even at the present day we find the Berkshire has the tendency when their breeding is neglected, though we look upon this as a sign of degeneracy more than as a result of neglect. Historical records further prove that the Berkshires of olden times were of a reddish hue (they have a "red" Berkshire breed in America to-day). So it was that between the several types fanciers of the red hog made their choice and by continued effort in the direction named they eventually produced a permanently red pig of great value.

Then came the christening of the breed. The Spanish type had come to be known as the Jersey Reds, and those found so numerous in Saratoga were styled the Durocs. The blending of the two types proved so profitable that it was decided to combine the two names, using the American type as the standard, hence they have from that date been known under the title of the Duroc-Jersey. Other names by which the breed had previously been known were the Jerseys, the Red Rocks, the Clay Rocks, the Dewrocks, Red Graziers, Red Berkshires, and Red Guineas. In 1883 the American Duroc-Jersey Swine Breeders' Association was formed in Chicago and the name was then formally adopted.

Nowadays the breed is largely sponsored in the United States by the National Duroc-Jersey Record Association, Fayette, at Monroe street, Peoria, Illinois.

Herd Book Standard.

The standard of excellence of the Duroc-Jersey breed, as adopted by the Australian Stud Pig Breeders' Society, and published in the current volume of the Herd Book, in which numerous registrations appear, is as follows:—

Head and Face.—Head of medium size, wide between eyes and ears; face slightly dishd, neat and attractive.

Eyes.—Bright and prominent.

Ears.—Medium size, not coarse and heavy, pointing forward and slightly outwards, well under the control of animal.

Neck.—Short, thick, deep, slightly arched.

Jowl.—Broad, full, yet not coarse and heavy.

Shoulders.—Very deep and full, not too heavy on top. In boars, the shield should not be too heavy.

Chest.—Wide, deep, roomy, well filled behind shoulder, breast-bone prominent

Back and Loin.—Back medium width and length, slightly arched, carrying even width from shoulder to ham, surface even and smooth.

Sides and Ribs.—Sides very deep, medium length, level top-line. Ribs long, strong, and well sprung.

Belly and Flank.—Full-fleshed, roomy, flanks well let down. Teats evenly placed, twelve to fourteen in number. In males, sheath to be free from abscesses or enlargements.

Hams and Rump.—Broad, full, and well let down to the hocks; rump should have round slope from loin to root of tail, same width as back and well filled out around tail.

Legs and Feet.—Medium size, strong, wide apart, yet well set under body, pasterns short, strong, feet short, not splayed.

Tail.—Medium thickness, well curled, rather bushy flag.

Coat.—Fine, moderately thick and straight, covering body well.

Colour.—Cherry red, without any other admixtures.

Size.—Large for age and condition. Medium weights desired.

Action and Style.—Action animated and vigorous; style free and easy.

Condition.—Healthy, skin free from scurf, &c.; flesh mellow, skin soft, hair silky.

Disposition.—Very quiet and gentle, easily driven or handled.

MOTOR TRANSPORT OF PIGS TO MARKET.

A good deal has been heard during recent months in regard to the successful and rapid transport of sheep per motor lorry from one district to another in Queensland. The experiments that have already been carried out have demonstrated the possibility of this scheme being put into action over wide areas of country with results that should mean the saving of thousands of sheep and indirectly benefiting both those engaged in the industry and the industry and State generally.

It is interesting in this connection to note that equally successful and equally rapid transport of pigs to market is possible and commercially profitable.

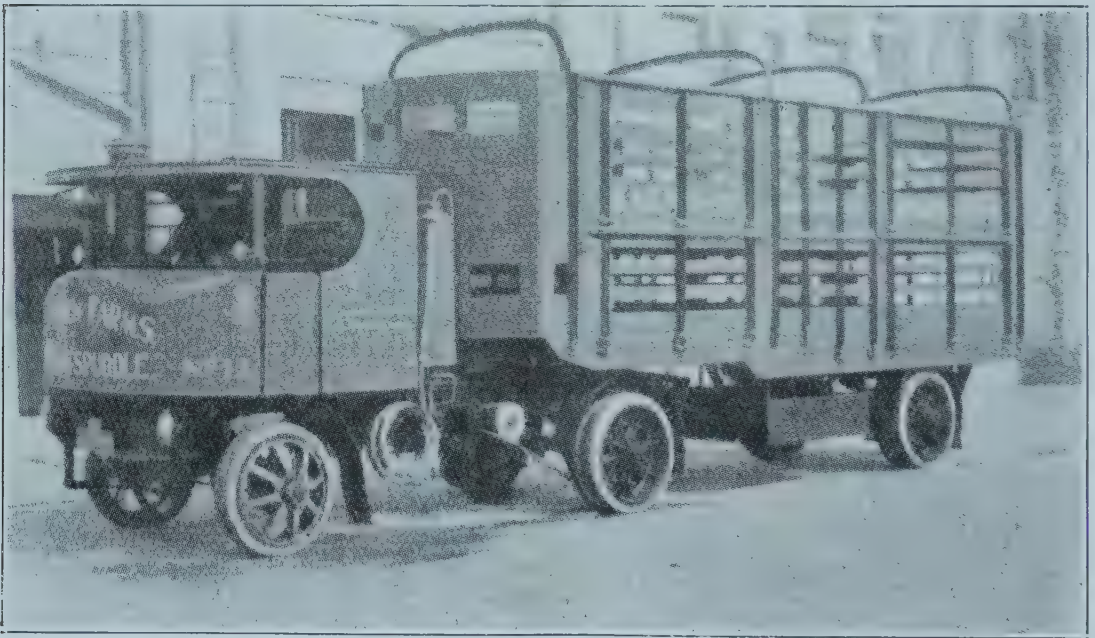


PLATE 81.—A SUPER SENTINEL PIG LORRY.

Double-decked and, when fully loaded, carrying seventy-two full sized bacon pigs or a larger number of porkers or store pigs. It is the property of Mr. E. R. Debenham, Bladen Farms, Briantspuddle, England.

The modern conveyance (See Plate 81), built to the order of Mr. E. R. Debenham, of Bladen Farms, Briantspuddle, England, for this purpose is double-decked, and carries when fully loaded seventy-two prime bacon pigs. It is used to transport bacon pigs from the Bladen Farms to Calne Bacon Factory. It then picks up a load of goods for Bristol, from whence it departs with a load of foodstuffs on the return trip to Briantspuddle where the home farms are situate.

There are many districts in Queensland where such a conveyance would prove a godsend and where pig raising would be carried on much more extensively than at present with our comparatively slow and oftentimes burdensome means of transport. Motor transport certainly appears to be the order of the day.—E. J. SHELTON, Instructor in Pig Raising.

STERILITY IN BREEDING SOWS.

We have received many inquiries on the subject of sterility or barrenness in sows, of which the following is typical:—

“I have two Berkshire sows and one boar which have been specially selected from a leading stud as foundation stock for my Berkshire herd. These pigs are now nearly eighteen months old but up till the present the sows have had no litters and they have not shown any inclination to breed. They are running in a 2-acre paddock, sometimes with the boar and sometimes apart, but the boar does not seem to have any inclination to breed either. I think the pigs have been handled correctly though for some months during the summer both boar and sows were rather fat, but during recent months they have been out grazing and are not over-fat now. What I should like to know is, is there any way of inducing activity, and is it any use carrying these animals on any longer?”

The following answer was supplied by the Instructor in Pig Raising, Mr. E. J. Shelton:—

A great many of the cases of sterility and barrenness in pigs are due to the animals being over-fat and lazy. There are many instances also in which the boar is too fat and lacking vigour. It is unfortunate that many strains of pigs, particularly purebred pigs, have been practically ruined through being kept in very fat show condition for exhibition purposes over lengthy periods; it is equally unfortunate that many of their progeny suffer as a result and fail to breed satisfactorily if they breed at all. These conditions can very largely be overcome by reducing the condition, first by a lessened diet, by the use of green foods and also by compulsory and regular exercise. Frequent doses of Epsom salts should be given, using from two to four ounce packets per dose in half a pint of warm water, preferably as a drench first thing in the morning or in the food. The pigs should be compelled to hunt for part of their living by grazing over reasonably large, well-grassed pig paddocks (an acre or more in area). Green foods—lucerne, burseem (Egyptian clover), sorghums, pumpkins, rape, and barley—root crops—sweet potatoes and artichokes, &c.—are suggested. Some cases of barrenness are due to septic inflammation of the womb the result of germ infection due to stock being kept in unclean sties, and to boars serving clean sows after having bred to sows suffering from infectious diseases of the womb. In these cases, and in all cases where the sows will not hold to the service of the boar, it is advised to syringe the uterus with a solution of one teaspoonful of table salt in one pint of sterile water—i.e., water which has been boiled and allowed to cool down to blood heat. If this does not give satisfactory results try 20 grains of permanganate of potash in one pint of sterile water at blood heat and follow up with the salt solution every day for three days before service. During treatment also give Epsom salts as recommended. It is advisable also if at all possible to change the boar, using a young vigorous animal. The sows should be kept away from the boar until they are ready for service, and after being stunted they should be immediately placed in a clean dry sty away from all other pigs, and should be kept very quiet for several hours. If they still seem restless mate them again the following evening and follow the same practice. Sterility and barrenness are also often induced through the animals being improperly nourished and through their lacking stamina and vitality.

Many sows commence stud duties too young, many boars also are ruined in this way; neither should be used for stud purposes before ten or twelve months old.

Hereditary influence is also a factor, the progeny of shy breeders often failing to breed at all. Injuries to the genital organs of the male are also a frequent cause of the sows failing to breed. The boar may have become weakened through frequent unsuccessful attempts at service, this especially so where a young boar is running with a lot of full grown sows. The boar in this case is often punished severely by the sows and kept away from the food trough. It frequently happens that a young boar so injured becomes so “cowed” that he is ever afterwards afraid and becomes quite effeminate. There are many other causes, too, such as the use of improperly balanced rations, disease of the genital organs of the boar, hot, dry seasons, and so on.

The remedy lies in the removal of the cause wherever that is possible and in culling out unsatisfactory breeders. Satisfactory specifics for the treatment of pigs that are unsatisfactory breeders are well advertised. In a general way, however, we do not recommend the use of medicinal agents for the purpose indicated.

THE COTTON BOARD AND B.A.C.A.

The Deputy Premier and Minister for Agriculture (Hon. W. Forgan Smith), stated in the course of a recent Press announcement that he had received a deputation from the Cotton Pool Board, with whom matters relating to the ginning and marketing of cotton for the ensuing season were discussed. The deputation explained to him that the Cotton Pool Board for some time had been in negotiation with the British-Australian Cotton Association with regard to the price to be paid for ginning and other services which that Association can render, and informed the Minister that, in the opinion of the Board, the price for services quoted by the British-Australian Cotton Association was too high and that it involved a charge on the industry which would seriously limit its development. The deputation was advised by Mr. Forgan Smith to continue negotiations with the British-Australian Cotton Association and endeavour to secure a more equitable arrangement. This the deputation agreed to do. The British-Australian Cotton Association has established six ginneries and one oil-mill in Queensland at a considerable capital cost. For the ensuing year one, or not more than two, ginneries would be required, and consequently it is contended, the price for ginning should be based on the capital necessary or employed for the reasonable requirements of the industry, and should not be based on the capital that is unnecessary and not required.

WHEAT CROP PROSPECTS IN THE MARANOA.

Subsoil moisture as a result of good soaking rains aggregating about $4\frac{1}{2}$ inches, which fell in the Maranoa district last May, helped to establish and carry on the young wheat crops, and in this respect the district was more favoured than the chief wheat-growing centres on the Darling Downs.

Since then, however, the crops have had a fairly hard struggle to carry on. Generally speaking, the growth made was short; the plants have stooled lightly, and the ears for the most part are dry-weather tipped; but notwithstanding all the drawbacks the wheat is of good colour, and even if no more rain falls between now and harvest time, the yield should run from 8 to 10 bushels per acre in the Maranoa district for crops which are being allowed to mature. Immediate rain would still do good, as the major part of the crops will not ripen normally for another three or four weeks.

Evidence of droughty conditions may be gathered from the fact that only about 20 points of rain were recorded in the last ten weeks, and the aggregate fall from the beginning of June to date was from 80 to 110 points. One outstanding feature is the remarkable capacity of the Western district soils to withstand dry conditions, and another equally remarkable thing is the drought-resistant quality of the wheat plant.

A proportion of the district crops has already been used for feeding off by working horses, dairy cattle, and sheep, as latterly pastures had given out. One fact calculated to effect a gradual improvement in the position of the wheatgrower as a settler is the effort being made to extend his holding, generally all too small, and acquire a living area to permit of a combination of sheep and wheat. Those who are in a position to develop along these lines will undoubtedly come through successfully in the long run.

The best grown crops seen were at Bindango, and the best individual crop was Cedric wheat, where there was only a dividing fence between the fields of wheat and the Mount Abundance land now being designed for settlement.

In the neighbourhood of Hodgson and Wallumbilla there are also some fairly good crops, the better being those grown on early prepared and well-worked fallowed land. Generally speaking, the most promising varieties were those raised in the first place at the Roma State Farm. Splendid work is being carried out at this institution in the way of breeding and the evolving of types of wheat to suit Queensland conditions.

This year the stud wheats at this Farm, although short in the straw, look particularly well, and it will be possible in such a season as the present to determine the behaviour of a number of new varieties when grown under drought conditions. So far, the wheats of particular note are those with a short growing season.

For some years special attention has been given by the Wheat Breeder, Mr. R. E. Soutter, to the segregation and development of quick maturing strains of wheat, and it is satisfactory to note that one very promising variety, "Watchman"—a cross between Soutter's Early and Warren—promises to be the quickest maturing variety amongst Queensland-grown wheats; one field at the Roma State Farm is just about ready to harvest, being about three weeks in advance of the ordinary varieties grown in the district.—H. C. QUODLING, Director of Agriculture.

Answers to Correspondents.

Information to Farmers.

W.R. (Kawl Kawl)—

There is absolutely no charge for information to farmers conveyed through the Journal. The Journal is supplied free to all engaged in land occupation on the prepayment of 1s. to cover the annual cost of postage. Inquiries should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane. Many thousands of letters are received in the course of the year, and replies are addressed to correspondents directly. It is, of course, impossible to answer every inquiry through the Journal, and only replies judged to be of general interest can be inserted in these pages.

BOTANY.

In the course of the month the Government Botanist, Mr. C. T. White, F.L.S., addressed the following replies to correspondents, and which are of general interest.

Umbrella Tree (*Brassaia actinophylla*)—Jacaranda.

F. (Darra)—

The plants are—(1) the plant with glossy leaves and long red flowering or fruiting sprays—*Brassaia actinophylla*, the Umbrella tree—a native of North Queensland; it is not known to possess any harmful properties. It is very largely grown as an ornamental tree. (2) The tree with feathery leaves—the Jacaranda (*Jacaranda mimosæfolia*), a native of South America, widely cultivated through the tropics and subtropics as a flowering tree. Many people in Queensland claim that when in flower it causes “hay-fever,” and also the flowers falling in roof guttering make the water unfit for drinking, if drunk causing gastric troubles; these suspicions, however, have never been definitely proved.

“Wild Lime,” or “Desert Lime” (*Eremocitrus glauca*).

W.L. (Toowoomba)—

The specimen is *Eremocitrus glauca*, the “Wild Lime” or “Desert Lime.” It produces a small, pleasant, acidulous fruit. In the “Queensland Flora,” and other works, this tree is referred to as *Atlantia glauca*, but Dr. Swingle, of the United States Department of Agriculture, a keen worker on all citrus matters, has taken it as the type of a new genus *Eremocitrus*, and I am inclined to agree with him. The Americans have taken a great interest in this plant as the possible source of a drought-resistant stock for citrus culture.

Wild Gooseberry—Native Bryony—“Poison Peach.”

Johnstone River A.S.—

The three specimens proved to be:—(a) Known as Wild Gooseberry. This is *Rubus Hillii*, the Native Raspberry. It is not known to be harmful in any way. (b) *Bryonia lacinosa*. Native Bryony or Striped Melon—very poisonous. See leaflet. (c) *Trema aspera*. Poison Peach or Wild Peach. At times the leaves of this shrub develop a prussic acid yielding glucoside, and are then poisonous if eaten in quantity. I have, however, often seen the plant eaten extensively by stock without ill-effects following. See leaflet.

Darnel Grass (*Lolium temulentum*).

T.W.L. (Stanthorpe)—

The seedling grass has now flowered and proves to be *Lolium temulentum*, the Darnel. The grass is widely distributed over the temperate regions of the world, mostly as a weed in cultivation. It has a bad reputation, the seeds being poisonous, though fatal results are rare. Before seeding the grass is a palatable and nutritious feed for stock. The grass is not uncommon in Queensland, but I have never heard of any harmful effects caused by it here.

Red Currant Bush—Milky Vine—Wild Peach—Water Vine.

R.A.M. (Innisfail)—

Specimens forwarded proved to be—Red Currant Bush—*Breynia cernua*. Very common in parts of North Queensland, sometimes called “Coffee Bush.” It extends to the East Indies and Philippine Islands; is not known to possess any poisonous properties. The family it belongs to, however (the Euphorbiaceæ), possesses several poisonous plants.

Milky Vine—*Faradaya splendida*. This is one of the vines used by the North Queensland aborigines as a fish poison. In experimental work dilute infusions of it were found to be potent. The active principle is a saponin. Its effect on stock is not known, but it probably would prove poisonous.

Wild Peach—*Vitex trifolia*. This is not the shrub usually known as “Wild Peach” or “Peach Poison.” It is very common along the coast, and is not known to be harmful in any way.

Water Vine—*Vitis* sp. Not known to be poisonous or harmful in any way.

It is often difficult in scrub areas to pick any one plant as the cause of losses among stock, as many species among the secondary growth are somewhat poisonous and are not eaten by stock. During dry times stock may take to these plants with fatal results. A vine to look for on your place is the Tape Vine (*Stephania hernandizifolia*); this has a round, somewhat heart-shaped leaf, glossy above and dull and paler beneath. Cattle mortality has occurred at various times through eating it.

“Galvanized Burr”—(*Bassia Eirchii*).

“INQUIRER” (Ipswich)—

The plant most commonly known as Galvanised Burr, and that has been gazetted a noxious plant, is *Bassia Birchii*. The popular name is derived from the dull greyish colour of the plant and its hard woody nature. It is a very common inland weed, but is rarely seen on the coast. The neighbourhood of Laidley and Gatton is the nearest place to Ipswich where it has been observed.

“Medick Burr” or “Burr Trefoil” (*Medicago laciniata*).

A.P. (Gayndah)—

The specimen proved to be *Medicago laciniata*, a species of “Medick Burr” or “Burr Trefoil.” It is a native of the Mediterranean region and is naturalised in Australia. It is fairly common in New South Wales, but I have never before received specimens from Queensland. It is a valuable nutritious fodder; even after the plant dies down the dry burrs or pods are readily eaten by stock. The species is said to stand dry weather better than most of the trefoils, the only objection being that the burrs, which are borne in great abundance, are troublesome in sheep country.

“Ooline” (*Cadellia pentastylis*).

“INQUIRER” (Brisbane)—

The specimen of leaves and wood from Tambo is *Cadellia pentastylis*, “Ooline.” Ooline is the commonest name by which it is known in Western Queensland, though it also goes under the names of Solidwood (Taroom) and Mahogany (Tambo).

The Kurrajong Tree.

J.C.P. (Warwick)—

Kurrajong trees are best raised from seeds, and are fairly easily transplanted. They can be raised in special beds and transplanted when large enough. Experience has shown that trees 3 feet and over move fairly well—in fact, better than smaller plants. Kurrajong trees are used a great deal in the Southern States for street planting; for this purpose the seed is generally sown in flat wooden boxes or trays; kerosene tins cut in halves lengthwise are useful: they are then placed in plots or tins and moved with a good ball of earth. You should be able to obtain seed locally from trees growing at Warwick or neighbourhood; if not, local seedsmen should be able to supply. If local seedsmen do not carry stocks, most of the Southern people do. The Southern price is 1s. 6d. each plant.

Phalaris Grass—Trefoil.

F.R.D. (Pittsworth)—

The grass is *Phalaris* sp., a stunted specimen of one of the *Phalaris* or canary grasses, not known to be harmful in any way. The trefoil is *Medicago minima*, one of the Medick Burrs or Burr Trefoils. These plants are common in New South Wales and Southern Queensland, and are generally regarded as good fodders; they are not known to possess any poisonous properties, but if eaten by hungry stock, often cause bloat. If the trouble is really due to weeds, the cause must be looked for among plants other than those sent.

White Bauhinia.

J.C. (Westwood)—

The specimen forwarded with your letter of the 31st ultimo proved to be *Bauhinia candida*, the White Bauhinia. It is a native of India, but is cultivated extensively as an ornamental tree over the warmer regions of the world. The generic name commemorates the brothers Bauhin, two early well-known botanists. If you look at the "twin" leaf you will see the appropriateness of the name. We have several species of *Bauhinia* native to Queensland and among our most beautiful trees.

"Tie Bush" (*Wikstroemia indica*).

J.F.H. (Dundas)—

The specimen is *Wikstroemia indica*, often called "Tie Bush" on account of the bark being very pliable and fibrous. The plant has been suspected at various times of poisoning stock, but feeding tests carried out at the Stock Experiment Station gave the following results:—Fourth day—Scours. Fifth day—Scours with traces of blood. Seventh day—Slight improvement, and condition then remained the same till the eleventh day, when the feeding tests were stopped. As the plant is one generally avoided by stock, the animals ate a great deal more than they would under ordinary conditions, and it appears to have had no other effect on them than to cause severe scouring. Had the feeding been continued, the animals would quite likely have died from scours and malnutrition, but stock would hardly ever eat sufficient of the plant for this to occur under natural conditions.

From the foregoing you will see that the plant is an undesirable one and should be eradicated, but if you are losing stock every year I would be inclined to look elsewhere for the cause of the trouble. If after the eradication of the Tie Bush you are still losing stock, send specimens for report of any weeds or undergrowth growing on your property. If this is not satisfactory, perhaps a visit to your property could be arranged, and the paddock or paddocks examined for poisonous plants.

Hoya Vine.

"INQUIRER" (Nanango)—

The plant is Hoya Vine (*Hoya australis*), a fairly common climber in the scrubs of Coastal Queensland, both over trees and rocks. The plant is poisonous, so far as known, at all stages of its growth. The following treatment of affected animals has been recommended by Mr. A. McGown, M.R.C.V.S., Government Veterinary Surgeon:—"1 lb. Epsom salts and 1 lb. treacle should be given as soon as the animal is noticed to be sick, which should be followed daily with 2 dr. potassium iodide in half a pint of water."

Reputed Stock Poisoning Plant—Native Fuchsia (*Eremophila maculata*).

"INQUIRER" (Lake's Creek)—

From the symptoms given Mr. White suspects the Native Fuchsia (*Eremophila maculata*). He does not know the country around Capella personally, but Native Fuchsia is fairly common in the Central district around Emerald and other parts. There is much controversy among stockmen concerning this plant, many looking on it as a good fodder. Stock certainly at times eat large quantities without ill effects following, but sometimes the plant develops a prussic acid yielding glucoside (like young sorghum) in abundance, and is then poisonous. What controls the formation of these glucosides in plants is at the present time unknown.

Ringbarking.

R.S.M. (Surat)—

There has always been controversy in Australia regarding the proper times of ringbarking different trees, but the weight of evidence seems to favour the mid or late summer months—February and March—as the best times of the year to carry the work out—that is, when the sap is well “up” and the tree in full growth. These months apply to the Sandalwood.

Suitable Trees for Planting.

M.H.G. (Cecil Plains)—Here is a short list of trees suitable for planting about Cecil Plains:—

Native trees—

Pittosporum (*Pittosporum undulatum*).

Lagunaria (*Lagunaria Patersonii*).

Kurrajong (*Sterculia diversifolia*).

Bottle Tree (*Sterculia rupestris*).

Crow's Ash (*Flindersia australis*).—One of the best of the native shade trees, but frost may get it in the young stage at Cecil Plains.

Queensland Nut (*Macadamia ternifolia*).

Wattles (*Acacia* spp.).

Gums (*Eucalyptus* spp.).

Silky Oak (*Grevillea robusta*).

Figs (*Ficus* spp.).

Cypress Pine (*Callistris* sp.).

Hoop Pine (*Araucaria Cunninghamii*).

Exotic trees—

Pepper Tree (*Schinus molle*).

Broad-leaved Pepper Tree (*Schinus terebinthifolius*).

Plane Tree (*Platanus* sp.).

Phytolacca Tree (*Phytolacca dioica*).—A valuable fodder.

Portuguese Elm (*Celtis*).—A valuable fodder.

Carob Bean (*Gleditschia*).

Privet (*Ligustrum*).

Camphor Tree (*Cinnamomum camphora*).—May be cut back by frost at Cecil Plains.

Oaks (*Quercus* spp.).

Pines (*Pinus* spp.).—The best, I think, are *Pinus insignis* and *P. longifolia*.

Cypress Pines (*Cupressus* sp.).

Junipers (*Juniperus* spp.).

Palms.—The Wine palm (*Cocos yatay*), the Cotton Palm (*Brachea filamentosa*), and some of the *Phoenix* are worth trying; all these do well at Toowoomba. The Cotton Palm, at least, should grow at Cecil Plains.

Native Grasses—Bush Hay—Forage Trees.

We have not made analyses of Mitchell grass at different stages of growth, but I have no doubt that the correspondent is right when he states “Mitchell grass, after six months' dry weather, possesses very poor feeding qualities and stock will fall away and die.” The question of bush hay or Mitchell grass hay, however, is a totally different matter; the value of this after a number of years depends very largely on the stage at which the grass is cut. It is useless to cut Mitchell grass at the end of the summer or early winter when the seed is being shed or during a long, dry spell; the best time is after the early summer rains, when the seed heads are nearly, but not quite, ripe. Mitchell grass cut at this stage and carefully stored should last for years and retain a good proportion of its nutritive value.

I do not think anybody will question the fact that a great deal could be done in Queensland to minimise the effects of droughts which occur periodically. The subdivision of larger properties and the periodical spelling of some of the paddocks should help; it is marvellous the length of time many native grasses and herbage will keep green if left untouched by stock. No grass can stand its green shoots being constantly picked off as fresh ones appear. The value of bush hay has already been referred to.

The planting of forage trees should be part and parcel of the routine of every Western property. There are a number of valuable native trees well known to every stockowner; most of these are, unfortunately, of comparatively slow growth, and their extensive use will consist more in conservation than in planting—this cannot be said of all, however—*e.g.*, the Kurrajong. Some exotic trees are also worthy of trial in this respect—*e.g.*, the *Phytolacca* tree and *Celtis sinensis* (the latter in Queensland commonly miscalled “Portugese Elm”) are worthy of note.

SELECTION OF NATIVE FODDER TREES.

Mulga (*Acacia aneura*).—One of the very best of the inland fodder trees. Would likely be of very slow growth under cultivation.

Kurrajong (*Sterculia diversifolia* or *Brachychiton populneum*).—One of the best of the native trees for extensive planting, easily raised from seed and of fairly quick growth.

Bottle Tree (*Brachychiton rupestre*).—Can be raised from seed and of fair growth; can be readily transplanted from local scrubs where it is growing.

Whitewood (*Atalaya hemiglauca*).—Liked by stock; the young shoots are said to kill working horses, but otherwise an excellent fodder.

Olane or Emu Apple (*Owenia acidula*).—A beautiful tree and a useful fodder, but rather difficult of propagation and of fairly slow growth.

Wilga (*Geijera parviflora*) has rather a mixed reputation; a useful standby.

Apple Trees (*Angophora subvelutina* and *Angophora intermedia*) are useful as roughage, but are not very nutritious.

Oaks (*Casuarina species*) are used extensively; the commonest in Western Queensland is the Belar. The one with best reputation as a fodder in Australia is the Drooping Oak (*Casuarina stricta*). It is not found in Queensland.

Supple Jack (*Ventilago viminalis*) is usually regarded as excellent.

Leopard Wood (*Flindersia maculosa*) is common in parts of Western Queensland and New South Wales. It is relished by stock; the seed is very light, and the tree would probably be of very slow growth in cultivation.

Red Ash (*Alphitonia exulosa*) is a tree worth extensive planting. It can be raised fairly easily from seed, and is of comparatively quick growth.

Sideroxylon Pohlmanianum var. *vestitum* is a tree common in parts of North Queensland from Townsville to the Gulf. The leaves are relished by all classes of stock. Others of the same family are eaten readily and are fairly nutritious. Most of these have no common names.

Figs (*Ficus species*) are trees, the leaves of which would provide large quantities of forage.

The *Phytolacca* Tree (*Phytolacca dioica*) is a native of South America; is a very rapid grower; is easily raised from seeds. Analysis shows the leaves to be highly nutritious. It is a very heavily foliaged tree and yields a high amount of forage. My attention was first drawn to the use of this tree as a forage by Mr. Robert Dick, of Purga.

Celtis sinensis is a native of China—miscalled in Queensland “Portugese Elm.” It is a deciduous tree and does well in Central Queensland; for colder parts *Celtis australis* (the true Portugese Elm) is the better species.

The Algaroba or Mesquite Bean (*Prosopis juliflora*) is suitable for the coast and warmer parts of the State. Though a great deal has been heard of this tree as a fodder, its value, in my opinion, is small in comparison with some of our native trees or of the other exotics mentioned here.

The Carob Bean (*Ceratonia siliqua*) is useful for the cooler parts of the State only. The trees are dioecious—that is, the male and the female trees are distinct; the females, of course, are the only pod-bearers.

The Honey Bean or Honey Locust (*Gleditschia triacanthus*) is another exotic, the pods of which are eaten by stock. This tree also does well in the cooler parts of the State.

PIG RAISING.

Following are selected replies to correspondents by the Instructor in Pig Raising (Mr. E. J. Shelton, H.D.A.) in the course of the month, and which are of general interest:—

Pig Feeds and Feeding.

C.B. (Didecot)—

If you cultivate a larger area of sweet potatoes and even only a small area of lucerne, in addition to an area of improved cow-cane or some other variety of sugar-cane, or of saccaline or other variety of sorghum, plus pumpkins and melons, these crops would provide a rotation of green foods for use during dry periods and periods of shortage. Mangel wurzel is one of the most satisfactory root crops, particularly for feeding to breeding sows. Apparently the pigs you lost consumed too much barley grain, and after drinking freely the stomach became over-full, and this in turn caused rupture of the tissues.

It is not usual for pigs to suffer from hoven, though this is a common trouble with cattle, but it is very risky allowing animals to consume too much dry grain and then to have free access to unlimited supplies of water. Careful feeding and management, and the provision of good fences and suitable accommodation, are all points to which attention should be given if success is to be assured.

Berkshire-Tamworth Cross.

R.C. (Colosseum)—

We consider the class of sow to which you refer (viz., sows first cross by Berkshire boar from Tamworth sows) as quite suitable for breeding purposes for the production of bacon pigs, but would prefer to recommend that these sows be mated back to an unrelated Berkshire or Poland-China boar in preference to a Tamworth boar. We advocate the paddock (or colony) system of feeding in preference to a continuous system of sty feeding, though we also recommend reducing the range as the pigs approach the final marketing stage. It is at this stage also that the pigs require topping up on a proportion of grain, though care must be taken to see that they do not become over-fat, for there is no demand for very fat bacon nowadays. The self-feeder system is quite all right, provided the pigs have a limited grain allowance, and an abundance of green food and plenty of good drinking water. Some experience is, of course, necessary to know just when to top a bacon pig off and to know when he is in prime condition. The matter of weight, &c., is referred to fully in the pamphlets. Cowpeas are an excellent grain and protein (flesh-forming) food, while Dwarf Essex rape (preferably sown in conjunction with skinless barley) makes ideal grazing during the latter months of winter and during spring and early summer. Just at present we have no plans available for self-feeders, but hope to have these available shortly, when a copy will be forwarded on to you.

Pig Management.

W.J.S. (Marrai, N.S.W.)—

The young pigs have apparently suffered from severe frost bite. Frost bite would cause the skin peeling off the pig's ears. This would be probably helped by hog lice and possibly the small lice, which causes mange. Have affected animals carefully washed with warm water and soft soap; oil them freely with some vegetable oil or crude castor oil to which a small quantity of kerosene is added (you could utilise pig fat or even mutton fat for this purpose, being careful to see that each portion of the pig is treated). Careful feeding and soft, succulent food are necessary. Give the animals a course of Epsom salts, using from teaspoonful to desertspoonful doses daily for three or four days, according to size and the age of animals. The trouble, of course, may have been exaggerated by weed growth in the pig runs, as some weeds like stinging nettle and similar weeds are liable to affect the skin of the pigs.

R.H.P. (Oatlands, Tasmania)—

Queensland is favourably situated geographically for expansion in all lines of agriculture. Successful pig-raising must be essentially a crop-growing and a crop-marketing proposition, for there is little profit in depending for a food supply on the purchase of comparatively high-priced concentrates.

Pig Feeding.

G.W.C. (Birkdale)—

Malt culmings are not a very satisfactory food for pigs, though they can be used in with other foods in making up a suitable mash. It is preferable to grow lucerne and to spend the money on cultivating and fertilising the lucerne, for in this way you would secure a greater bulk of food of a very much higher feeding value than the somewhat tough and fibrous barley germ. Malt culmings and bran are very much more satisfactory when used as a food for cows than as food for pigs. Cattle require fairly large quantities of succulent food; pigs have a comparatively small stomach and cannot handle the extra bulk to advantage.

Trouble with Breeding Sows.

G.S. (Pinbarren Creek)—

It is noted that on p.m. examination a quantity of hair had accumulated in the stomach in the form of a ball, and that this and other complications resulted in stoppage of the bowels and in death. If you still have the hair ball, dry it in the sun, and enclose in a small box of sawdust, and forward it to this Office, as we are anxious to have further specimens of this description. These hair balls are described technically as "Trichobezoars," and that they vary considerably in size. Have dead calves and other stock carefully skinned and cooked before feeding to pigs, otherwise the carcasses should be burnt, and not be used as a pig food at all. There is also considerable risk in feeding carcasses to pigs before the meat has been thoroughly cooked, while, from your own standpoint, it pays very much better to cook the meat mixed with some meal, grain, or root crop, and a liberal quantity of water. Feed as a mash, particularly to growing pigs and to pigs in the early stages of fattening. In this way there is practically no waste and no evil smell resulting, whereas where carcasses are thrown into the pigsties in a raw condition they become a hotbed of disease and a breeding-ground for blowflies, &c. The skins, if carefully removed and cared for, are also of value at most seasons of the year.

Pleurisy in Pigs.

T.S. (Kandanga)—

The young pigs, apparently, are suffering from pleurisy. There may be an affection of the ear also, the result of the formation of abscesses in the inner ear similar to the trouble referred to in the pamphlet forwarded dealing with a peculiar disease of the ear. Probably accommodation is not suitable, for cold, draughty sties and dry dusty yards are prolific sources of trouble among young and growing pigs. Pigs that wander about among wet grass and crops and that are not properly housed at night suffer great inconvenience, as also do pigs fed on comparatively dry fibrous foods, which are frequently indigestible, and the animal suffers severe pain as a result of indigestion and bowel disorders. Animals that are exposed to the frost during cold, wintry nights suffer severely from frost-bitten ears; an animal so affected on rising will walk about as if in great pain.

FIRST GRADE CREAM PRODUCTION—SIX ESSENTIALS.

1. The general provision of overhead water supply by means of tanks, windmills, and pumps.
2. The general provision of ample facilities for boiling water, such as a set-in copper or chip heater connected with the general water supply.
3. General use—first, of cold water; second, of warm water and washing soda for first washing; third, of boiling water for proper scalding; finally, drying of all dairy tinware and the cleaning of the milking plant.
4. More general knowledge of milking plants, especially in regard to their cleaning and handling.
5. The general adoption of the cooling of cream to as low a temperature as possible; keeping it in cool, clean, well-ventilated surroundings, stirring frequently and mixing when cool.
6. Daily delivery of all cream from farm to factory.

General Notes.

Stock Crossings on Southern Border.

Relative to the closure of the Habnarey crossing-place on the Queensland-New South Wales border, further advice has been received from the New South Wales authorities that, although the gate is closed to cattle, sheep may still be admitted into New South Wales through that crossing-place.

Staff Changes and Appointments.

The following persons have been appointed Officers under and for the purposes of the Animals and Birds Acts as from the 18th September, 1926:—

Messrs. F. S. Hodel, J. J. C. Hamilton, C. J. F. Miller, L. A. G. Boyce, and Neil Macdonald.

Bird Sanctuaries Proclaimed.

1. R. 125, parish of Mia Mia, county of Carlisle.
2. The Gorge and properties of F. E. Rudder and E. Bilbrough, Springbrook, county of Ward, parish of Numinbah, being land comprised in portions 25, 30, 79, 80, 88, 149, and 150, R. 465 (timber reserve), and R. 494 (recreation reserve).
3. Green Island, near Cairns.

State Wheat Board Levies.

A vote on the question of State Wheat Board levies, in connection with a General Reserve Fund and a Hail Insurance Reserve Fund, was conducted recently at the Department of Agriculture and Stock with the following results:—

General Reserve Fund—

For the levy	..	..	..	..	..	..	834 votes
Against the levy	..	..	..	..	..	..	1,284 „
Informal	..	..	..	..	..	..	17 „

Hail Insurance Reserve Fund—

For the levy	..	..	..	..	..	..	1,346 votes
Against the levy	..	..	..	..	..	..	768 „
Informal	..	..	..	..	..	..	17 „

Farm Planning.

The adoption of a sound plan for the farm buildings is an essential to the satisfactory working of the farm. This includes the selection of the site and the location of the various buildings in relation to each other.

A number of points need to be considered in fixing the site, among which are accessibility to the nearest public road, the position of the permanent water supply, the position of the farming area, and the suitability of the soil for gardening purposes.

The last is a point to which, as a rule, very little thought is given. Often in the early days of a farm the farmer has no time to beautify his home or to attempt to grow vegetables, fruit, &c., and the home site is chosen without thought in this direction. Ultimately, when attempts are made to establish a garden or orchard, they result in failure and considerable loss to the farmer owing to the unsuitability of the soil.

A garden can only be successfully established near the home, where a little time can be devoted to it frequently, and where it will be protected from birds, &c. Not so much attention has been given by many farmers to the advantages to be gained by growing much of their own food on the farm, but, with mounting costs and the difficulties in securing profitable returns for the products that are sold off the farm, farmers are endeavouring to make their farms more self-supporting. Furthermore, the pioneer stages of farming are passing in most districts, and farmers and their wives are acquiring greater knowledge and thriftiness, and both these things are making the farm garden and vegetable plot of increasing importance.

Co-operation—What it Means.

Co-operation is not something to be adopted and accepted, but rather something to be learned and acted.

Co-operation can only succeed when every member is willing to make some sacrifice and to do his part in making his organisation a success.

It is far easier to sit back and complain and find fault with those attempting to bring about improvement than it is to become an informed and active worker in securing the desired results.

Be yourself the leader, not the trailer. Set the standard as conscience dictates, then you will mould instead of being moulded.

Colouring Citrus Fruits—A Trade Practice.

To make it more saleable a considerable proportion of certain varieties of Florida oranges and grape fruit is coloured by a gas formed by the incomplete combustion of kerosene or similar petroleum product. This practice, which is regarded as a legitimate one, was begun in California a number of years ago (states the 'New York Journal of Commerce'), and nearly all packing houses there are now equipped for colouring.

In response to requests the United States Department of Agriculture undertook experiments with a view to adapting the process of colouring citrus fruits to conditions in Florida. The best results were obtained by having the stove outside the colouring room, the gas being piped in, thus preventing damage by excessive heat.

In the course of the experiments it was found that grape fruit and oranges can readily be coloured by the exhaust from a gasoline engine, by ethylene, as well as by the gas formed by the incomplete combustion of kerosene or other similar petroleum product. Grape fruit colours more readily than oranges, and early oranges assume the characteristic golden yellow colour more quickly than doth the spring-maturing Valencia. Oranges begin to show the desired colour within forty-eight to seventy-two hours after treatment is begun.

Cutworm Control.

The Entomological Branch of the Department of Agriculture and Stock has received numerous inquiries relating to the control of cutworms, and it seems desirable to give further publicity to the details of the control measure generally adopted against these serious pests. Poisoned baits are the standard remedy for cutworms, but, to be thoroughly effective, they should be used as soon as the attack is noticed. The bait may be made as follows:—

Bran, 50 lb.; Paris green, 2 lb.; molasses, 2 quarts; oranges, 3 fruits; water, 4 (approximately) gallons.

The Paris green and bran should be thoroughly mixed together, dry; the juice of the oranges, the finely chopped up fruit, and the molasses should then be added to some of the water. The latter mixture should now be combined with the Paris green and bran and should be thoroughly stirred, enough water being added to produce the right consistency. The right consistency must be determined by the user, but only sufficient water should be added to leave the mixture in a crumbly condition and thus dry enough to permit of being scattered broadcast on the ground; at the same time the quantity of water added must be such as to ensure that each flake of bran has been moistened by the molasses sufficiently to make it attractive and also to enable it to carry a small quantity of Paris green. It is better to have a barely moist bran mash than a thoroughly wet one because an unduly wet one becomes baked by the sun and rendered unattractive.

The baits should be distributed towards evening so that they will not lose their attractiveness to the cutworms when they come out to feed at night. Do not use these baits where fowls or other animals have access to the ground treated, and remember that Paris green is very poisonous and must be handled with corresponding care. The quantity mentioned above is sufficient for several acres; smaller quantities can be, of course, made up if smaller areas are to be treated. Where only garden plots or very small areas are to be dealt with broadcasting may be abandoned in favour of distribution by placing a teaspoonful of the mixture near the base of each plant likely to be attacked. If no fruit is available the bran mash can still be used, but it is always desirable to have it sweetened.

Noxious Plants.

Bathurst Burr (*Xanthium Spinosum*), Galvanised Burr (*Bassia Birchii*), and Noogoora Burr (*Xanthium Strumarium*) have been declared to be noxious plants for the purposes of "The Land Acts, 1910 to 1925." These are in addition to Prickly-pear, Zamia, and Desert Poison Bush, already defined as noxious plants by "The Land Act of 1910."

The End of the Milk Can.

"The knell of the milk can is sounding, and in five years or even less every consumer in London and probably throughout the country, will receive his milk in a machine-filled bottle." This prediction was made by Mr. P. B. Tustin, the technical adviser to United Dairies, Limited, at a meeting of the Royal Sanitary Institute at Weston-super-Mare (England). "The whole organisation of the milk trade," he added, "is being revolutionised to meet the new standards set by the leaders of the dairy industry and the Ministry of Health. The plants now being erected for pasteurisation and bottling, which eliminate all human contamination, can almost be described as machinery with a brain."

Fruit Trees and their Bearing Habits.

When the bearing habits of the different kinds of fruit trees are understood, it is possible to regulate the bearing of each individual tree. Fruit buds are easily distinguished by their larger and plumper appearance (writes Mr. G. W. Marshall, in the "Rhodesia Agricultural Journal"). With a moderate amount of experience it is possible to forecast the next fruit crop from the previous season's fruit bud formation. Pruning is done to regulate the fruit crops, especially when too much fruiting wood has been formed.

The fruit is produced in the different kinds of trees as follows:—

Apple and Pear.—On spurs chiefly, also from terminal and lateral buds, always on wood of the previous season's growth.

Quince.—From co-terminal buds, or wood of the current season's growth.

Peach and Nectarine.—On wood of the previous season's growth.

Apricots and Plums.—Generally fruit twigs, shoots and spurs from shoots produced during the previous season's growth.

Figs.—First crop previous season's wood. Second crop on current season's wood.

Citrus.—On current season's growth. Main crop of fruit on spring growth.

Vines.—On new rods of the season's growth.

Milk Maxims.

If the precautions necessary for the protection of dairy products from bacterial infection were observed as religiously as they are brought before the notice of the farmer, the need for the admonitions would have long since disappeared. Following are some rules enumerated by a writer in the "Journal of Agriculture of South Australia" as essential in the handling of milk:—

Strain all milk through a fine mesh strainer to remove small particles of dust and hair.

See that all utensils, cowyards, &c., are in a thoroughly clean condition.

Use lukewarm, then scalding, water for all utensils, milking machines, &c., and occasionally washing soda, then drain on a rack in a clean atmosphere.

Discard milk from diseased cows or those with injured quarters.

Milk from newly-calved cows, or those nearly dry and forward, should not be included with the rest. Always allow at least one week to elapse before using milk from the former.

Examine the water supply to see that it comes from a good source, free from harmful drainage.

During warm weather it is advisable to cool all milk in order to keep it in as sweet a condition as possible. Occasional stirring will help in this respect.

When holding milk, cover with gauze and keep in a cool, clean atmosphere, with free access of fresh air. Do not close up cans until immediately before delivery.

Avoid, as far as possible, carting whey in cans used for milk, because not only is it difficult to remove all traces of the whey, but the acid it contains will shorten the life of the cans. Avoid the use of can cloths or other absorbent material.

Animal Parasites—Combative Methods.

There are many varieties of parasites—some attack the skin, others the nasal chambers, liver, kidneys, lungs, &c.—but the most important are those of the digestive tract. The problems that face the farmer are, firstly, of course, diagnosis (a correct diagnosis is obviously all-important); and, secondly, curative and prophylactic (preventive) treatment. In determining the best measures of eradication (writes an officer of the Stock Branch of the N.S.W. Department of Agriculture), a knowledge of the life-history of the parasite is essential. Such a knowledge often bares the weakest point in the parasites' defence. The liver fluke of the sheep, for example, must in one of its larval forms inhabit the water snail, and it is by eliminating the snail that we effectively prevent fluke infestation. Other parasites, the life-histories of which we know quite well, are well-nigh impregnable once they have reached a certain stage. An instance of this is an intestinal worm of the horse, which parasite in its asexual stage finds lodgment in the walls of the main artery supplying the bowels. Once it has reached that location treatment is of no avail. This parasite is a frequent cause of colic in horses and ultimately causes their death. Other parasites, again, readily respond to curative treatment (for example, large round worms).

Treatment of parasitic conditions must be of a rational and practicable nature. In sick stock treatment comes first and prophylaxis second, but with apparently healthy stock prophylaxis takes first place. Whatever the procedure to be followed, the veterinarian is the adviser and the farmer the man of action, and unless the latter carries out his part faithfully the work of the veterinarian goes for nought. Often prophylaxis to be of use must be periodical—to control parasitic infestation of stomach worms in sheep, for instance, it is necessary to drench them with a vermicide once monthly. It is failure to recognise the necessity for constantly treating apparently healthy stock that in this relation constitutes the average farmer's most serious disability, and it is the general inadequacy of such treatment that in our chain of defence against parasitic invasion constitutes perhaps the weakest link.

Prophylaxis, like medicinal treatment—which itself is prophylactic, of course—varies with varying geographical and climatic conditions. It is of little use, again, to try to control parasites by medicaments that do not in passing through the body come in contact with them—such, for instance, as kidney worms in the perirenal fat of pigs and worm nodules in the submucosa of the intestines of sheep.

As far as we know at present, the only parasites that are accessible to medicaments are those in the digestive tract of horses, in the stomach and small intestines of pigs and ruminants, and certain blood-sucking parasites, such as liver fluke. Our present knowledge suggests, too, that certain organs are not accessible to treatment, and among these are the sublining (submucosa) of the digestive tract, connective tissue, except that under the skin (subcutaneous), liver substance, kidneys, perirenal fat, and musculature. Then there are parasitic conditions in locations that are apparently accessible, but that do not respond satisfactorily to treatment. Such locations are the lungs and air passages.

In applying preventive measures we often surmise too much; we often waste time, energy, and money, believing that two somewhat similar parasites have similar life-histories—there are men on the land who are of opinion certain preventive measures are applicable to all endo-parasites of all animals at all periods of the year. Then, finally, of course, there is the question of economy—not mere expenditure.

Even when the life-history is known, the application of rational prevention would sometimes result in a greater financial loss than the parasite itself, the cure being more costly than the disease. Such is the case with the tapeworm (*Taenia crassicollis*) of the cat, the parasite having its habitat in rats and mice as intermediate hosts.

Since the majority of worm eggs find a carrier in the pasturage, the farmer must make a determined effort to supervise the food supply; an uncontaminated food supply is every bit as important to live stock as it is to the human race. The farmer must be educated and advised to extend as far as is practicable those prophylactic measures generally applied in relation to human needs to those of domestic animals. Housing, receiving yards, and disposal of body wastes should receive special attention. With regard to most parasites of the digestive tract, the following general preventive measures are suggested:—

Do not overstock.

Remove stock frequently to fresh pastures.

Minimise the use of permanent pastures.

Cultivate, fallow, or dress with quicklime and salt paddocks recently depastured by parasitised stock.

Fully utilise paddocks containing stubble and fodder crops when not required for other uses.

Fence off low-lying, swampy ground and drain it.

Burn off pastures periodically to destroy worm eggs and larvæ.

When practicable use water from troughs in preference to still water, such as that in dams.

If the pasturage is lacking in chemical constituents, supply a lick of suitable ingredients.

Do not pasture parasitised animals with apparently sound ones.

Practise stock rotation. The parasites of horses, pigs, and ruminants are, generally speaking, peculiar to each species, and these stock can follow each other with little danger from pathogenic results.

Practise pasture rotation, though where land is limited this means constant thought, constant changes, and a considerable amount of expense in fencing, &c. It should be remembered that many larvæ worms reach the infective stage in from fourteen to twenty-one days following expulsion of the ova; and consequently pasture rotation must be as frequent as possible—the more frequent it is the more efficacious.

Let it be remembered, in conclusion, that eradication is preceded by control, and that control is preceded by knowledge, and that it is the farmer who makes a point of adding as much as possible to his knowledge, who aims at a high standard and works conscientiously to attain it, who is successful in the combat of parasitic pests and in the pursuit of animal husbandry generally.

Better Horses—The Menace of Mongrel Sires.

In the course of a paper on horse improvement at the recent State Conference of the Agricultural Bureau of New South Wales, Mr. M. L. Kingdon called attention to the menace constituted by the uncontrolled mongrel stallion, and the need for legislation in this relation.

To encourage and promote horse-breeding on proper lines, said the speaker, Government supervision of stallions was necessary. All stallions should undergo strict veterinary examination, and those successful in passing the test should be registered. Victoria, which had had compulsory registration of stallions for some years, furnished a good example of the benefit of such a measure. In recent years rapid strides had been made in that State in the improvement of draught horses, and a large number of undesirable stallions had been weeded out. Many of the rejects had probably found their way into New South Wales.

In the past horse-breeding had been of an indiscriminate nature, mostly from mondescript stallions, and the price was now being paid for past neglect. Every farmer should breed sufficient horses to replace his old worn-out animals. If he bred and kept his teams young by selling geldings at 5 or 6 years old, breeding would pay handsomely. In the event of a clearing sale his horses would realise big money.

Mechanical power on the farm, necessary and remunerative though it might be, was not going to displace the horse. The tractor was but an auxiliary to horses on a farm. Tractor depreciation costs were heavy, the fuel had to be imported, and no tractor yet manufactured had the power of reproducing its kind.

By not breeding horses of a better standard for city use, farmers were losing both horse and fodder sales.

One of the methods in vogue in America for encouraging horse-breeding was by boys' colt clubs, a scheme which could, perhaps, be adopted here. Show associations could render valuable assistance by giving prizes for the best colt or filly shown by a boy under 16 years of age, the idea, of course, being to encourage an interest in horses. But the best method of encouraging breeding and improving the standard was to adopt the plan introduced last year into New South Wales by the Coolamon A. and P. Association—a community scheme of stallion hiring.

Years ago Ruskin had given the assurance that the more sentimental of economists need not fear the too wide spread of the formalities of a mechanical agriculture. To-day, however, there were grounds for such a fear. The presence of a wise population implied the search for felicity as well as for wealth, and, to get the utmost satisfaction from their calling, farmers should have other interests besides that of securing the maximum financial return from their holdings. They would find that high-class live stock, particularly horses, would give them much pride and satisfaction, and if they were to adopt a proper system of horse-breeding their monetary returns would also be increased.

Sugar-Cane Technologists—Triennial Convention.

Arrangements have been made with the Cuban Government to hold the next convention of the International Society of Sugar Cane Technologists (an organisation to promote by means of triennial conventions the discussion of problems connected with sugar production in both field and factory) in Havana. The meetings will open on 14th March, 1927, and continue for about a week, with side trips in and about Havana. Following this, an excursion will be made to other parts of Cuba either in small groups or by the convention in a body, as may be decided.

The meeting that was held in Honolulu in August, 1924, was of great interest and value to all who attended. The Havana meeting, with the larger attendance that is expected, promises to be a most exceptional convention for those interested in the technical problems of sugar production.

Thirteen sugar-producing regions were represented at Honolulu—namely, Australia, Fiji, Formosa, Japan, Philippine Islands, India, Java, Chile, Mexico, Porto Rico, Cuba, Continental United States, and the Hawaiian Islands.

In all probability a much wider representation will be had at the Havana meeting, as the membership of the society now includes all the important cane sugar sections of the world.

Among the subjects to be discussed are—

Insect pests of sugar-cane.

Diseases of the sugar-cane plant.

Sugar-cane varieties and related problems of seed selection and seedling propagation.

Protective quarantine measures.

Field practices such as cultivation, fertilisation, tillage, &c.

The operation and chemical control of the cane sugar factory.

Technical papers presented at the meetings will be limited to approximate brevity, so as to allow adequate opportunity for an exchange of views by the representatives of the various sugar-producing sections. The plan followed so successfully at Honolulu, of having the topics discussed under the leadership of a qualified specialist, is thought to be a desirable one to use again.

All inquiries regarding hotel accommodation or similar matters may be addressed to Mr. E. L. Anderson, Secretary of the Cuba Sugar Club, Apartado 1973, Havana, Cuba. Mr. Anderson has kindly offered to assist in particulars of this kind.

Advantages of Milk Recording.

The advantages to be derived from milk recording are many. A writer in the "Rhodesian Agricultural Journal" includes the following in his list:—

Milk records indicate to us the poorest cows and those which do not pay for their feed.

They prevent our best cows from being sold or slaughtered.

They help us to discover great differences in cows as regards persistency in milk flow.

They help us to notice variations in yield and urge us to seek for the cause of these variations.

They enable us to bring in larger returns from fewer cows.

They help us to build up a profitable herd quickly, because heifers from the best cows only are kept as the basis.

They allow us to exercise more discrimination in apportioning feed according to yield.

A great stimulus to excel is received when records are compared with those of other farmers.

Employees take a great interest in records. Consequently the cows under their charge get better attention.

They increase the pleasure and interest in farming.

Financially the keeping of milk records is of great benefit. Young bulls are frequently sold at much higher prices if milk records of their dams are available than they otherwise would have been.

The Record of a Great Office.

The balance-sheet of the Public Curator of Queensland for the year ended 30th June, 1926, shows a net profit of £4,697. The Office has been in existence just ten years, and the accumulated profits amount to £40,000. This is, indeed, a splendid record of a great Office. Owing to the democratic constitution of the Public Curator Office, these profits do not pass or belong to the Government, but are invested by the Public Curator for the benefit of beneficiaries, whose interests are in his hands. It is, therefore, a mistake to assume that the Government makes a profit out of the administration of the Public Curator. All that the Government expects him to do is to make his Office pay its way without being a charge on the State and its taxpayers.

During the last decade, the Public Curator Office has not only not cost the Government one penny in salaries, equipment, and general expenses, but it has so reduced the cost of the administration of estates that all beneficiaries entitled to share in their distribution receive the benefit of the reduced charges.

The remarkable growth of the Office is its own commendation. More and more individuals are refusing to serve as Executors or Administrators for the reason that here is a Public Official guaranteed by the State for his integrity and just administration, whose duty and business it is to be the people's Executor, Administrator, or Trustee. In days gone by, to be named an executor by a friend was considered a compliment—an expression of his confidence in that friend's ability and integrity. But to-day, such duties are being handed over to the Corporate Executor, who has continuity of office, who never dies, and to whom beneficiaries can look with confidence and safety, knowing full well that when the time arrives for them to receive payment of their shares in estates, the money will be instantly forthcoming. It may be interesting to look into the matter of Estate Administration through the Corporate Executor's eyes.

People think of an estate as a lot of stocks, bonds, deeds, and other papers lying in a safe-deposit box with the owner's will on top. But to a corporate director like the Public Curator, an estate is a good deal like a fire alarm. When a man dies, he stops, but his estate does not stop. So promptness is one of the Executor's cardinal virtues. No time must be lost in getting to the estate, learning its nature, and taking steps to keep it going or to wind it up. As a corporation sole, the Public Curator has certain advantages over an individual executor or administrator. He has, for one thing, greater financial responsibility, which enables him to pay all duties without immediately sacrificing the assets to enable these compulsory Government duties to be paid. All estates entrusted to him are handled by an organisation instead of by a person, with obvious advantages in experience and judgment.

But because the Public Curator is a corporation sole, people may feel that his handling of estates and trusts will be coldly impersonal. Such, however, is not the case, because his officers are trained and encouraged to consult with interested persons in all matters of administration on the principle that, after all, it is their estate and the Public Curator is but their trustee, eager and anxious to carry out at all times, when advisable, their wishes in regard thereto.

Moreover, the Public Curator, having no personal or pecuniary interest in an estate, is not in any way influenced by personal animosities or family quarrels or prejudices. It is his duty to administer justly and impartially and *according to law*.

In reality, he is a liquidator. He takes charge of the property in an estate for the purpose of turning it into money, paying debts, taxes, duties, and other expenses, and distributing what is left according to the will or to the Statutes of Distribution. The law demands that he attend to his business diligently, and, though not required to make a profit, get as large a yield as possible out of the estate for the benefit of those interested in it.

The Royal Society of Queensland.

At the last ordinary monthly meeting of the Society the President, Dr. J. V. Duhig, M.B., was in chair. Dr. W. H. Tilling and Mr. S. Stephenson, M.A., were unanimously elected as ordinary members.

Dr. L. S. Bagster exhibited samples of leather tanned with syntan, mangrove bark extract, mixtures of syntan and mangrove bark extract, and leather tanned with mangrove bark extract and bleached by treatment with syntan. It was stated that the syntans or synthetic tanning materials were discovered by Stiasny, and several of them were patented in Austria and Germany. They are prepared by reaction between various coal tar products, such as cresol, and sulphuric acid and formaldehyde. When the syntans are used alone a white leather is produced. A further important property of the syntans is their power of dissolving the dark

colouring matters associated with vegetable tanning extracts such as those of mangrove barks. In consequence of this property, the syntans, when used in conjunction with mangrove extract, produce a much lighter coloured leather than that made with mangrove extract alone.

Professor H. C. Richards exhibited samples of material from the bore which was put down by the Great Barrier Reef Committee at Oyster Cay near Cairns. The bore attained a depth of 600 feet. The great majority of the material down to 400 feet consisted of broken coralline detritus. Some solid coral core was encountered between 10 and 17 feet from the surface. From 400 to 600 feet the material was non-coralline and composed to a great degree of rounded grains of quartz sand. The exhibitor stated that a cursory survey of the material from the bore seemed to indicate decisive evidence of subsidence which would substantiate Darwin's hypothesis of the origin of coral islands.

Dr. E. O. Marks exhibited a geode containing zeolites and lined internally with chalcedony. The specimen was obtained from Nanango.

Mr. H. A. Longman exhibited a juvenile specimen of the "Luth" or "Leathery Turtle," *Dermochelys coriacea*, from the Solomon Islands, which had been presented to the Queensland Museum. He also showed a sketch of a large specimen of this turtle which had been captured by some of the islanders off Anchor Bay in the Torres Strait. The sketch was forwarded by the Rev. W. H. MacFarlane, of Thursday Island, through Mr. Chas. Hedley. The sketch and the description accompanying it left no doubt as to the identity of this giant turtle, which was said to be about 8 feet 6 inches in length and was known to the natives by the name of "Zignaipu."

Messrs. Longman, C. T. White, B. Dunstan, and Drs. E. O. Marks and L. S. Bagster commented upon the exhibits.

Mr. C. T. White communicated a paper by the late J. H. Maiden and Mr. W. F. Blakely entitled "Descriptions of Seven New Queensland Acacias and One New Variety." The following new species are described and illustrated: *Acacia angusta*, *A. semirigida*, *A. pustula*, *A. attenuata*, *A. semilunata*, *A. jucunda*, *A. glaucocarpa*. *Acacia stipuligera* F. v. M. var. *glabrifolia* is described as a new variety.

A paper by Mr. G. H. Hardy entitled "Notes on Tasmanian Flies of the Genus *Atherimorpha*" was taken as read. The paper deals with a genus of the Leptidæ originally described from Tasmania, of which two species are now known, and three forms of one of these species are recognisable by slight structural and colour characters.

The President and Messrs. D. A. Herbert and H. A. Longman commented upon the paper by the late J. H. Maiden and Mr. W. F. Blakely.

Succouring Sheep—4,000 Fed on £1 a Day.

It remained for Mr. J. C. Rome, of Longford Downs, in the Julia Creek district, to solve the problem of keeping his flock of 4,000 sheep alive at a minimum cost of 18s. 10d. a day, as against £30 a 1,000 paid by some selectors and stations for agistment, with an attendant risk of losing a great proportion of the flock and the trouble and expense of reaching the agistment country (says the "Flinders Chronicle"). His idea is a simple one, and consists of a motor-truck which contains a pumping apparatus, the whole outfit costing £450, and when not pumping can be used in transport work. The pump is placed in the bore drains with hose attached, and the water is sprayed for a distance of 200 feet on each side of the drain, and when the ground has been given sufficient moisture it is removed further along the drain and a similar process followed. The soils respond immediately, and in about a week after there is a splendid crop of natural grass, several inches high, on which the sheep are depastured. By this means Mr. Rome has kept his sheep in excellent fettle, and can even turn off fat wethers if he desires. We understand that since Mr. Rome has demonstrated the success of this method, several other selectors, who at first laughed at the contrivance, are now adopting a similar procedure with equal results. Mr. Rome's property is situated only 6 miles from Julia Creek.

The foregoing news item is of more than ordinary interest, and on its being placed under the notice of the Agricultural Chemist, Mr. J. C. Brünnich, he made the following observations:—

"On turning over my records I find that, about the middle of April of the present year, Mr. J. C. Rome submitted a sample of water for analysis, to be tested with regard to suitability for irrigation purposes, and it was found that this water was of such purity as to be eminently suitable for such purposes.

"Mr. Rome's success is such as would justify other pastoralists who have a plentiful supply of water in submitting samples for analysis, in order to ascertain the value of such water for irrigation purposes."

Alleged Discovery of Remedy for Bunchy Top.

The Minister for Agriculture and Stock (Hon. W. Forgan Smith), in commenting upon a statement regarding the alleged discovery of the cause of bunchy top and its remedy that appeared in the Press recently, pointed out that it had been demonstrated beyond doubt that bunchy top is a disease due to the presence of an ultra-microscopic germ which is transmitted from affected plants to other plants by means of the dark banana aphid, *Pentalonia nigronervosa*, and once the disease has made its appearance in any stool nothing can remove the disease from that stool or from the affected stool. It cannot be over-emphasised that there is likewise proof to the effect that there is no connection whatsoever between any fungus and bunchy top.

It is regrettable that a banana-grower should be so carried away by his enthusiasm as to forget that before anyone can state that a fungus is the cause of a disease, it is necessary he should be equipped with the knowledge and apparatus which will enable him to isolate the fungus, cultivate it, and obtain pure cultures therefrom, and finally inoculate plants grown under specially protected conditions with the pure culture and so produce the disease.

The statement recently published to the effect that a fungus produced the disease may mislead many growers. The scientific world to-day accepts the verdict that bunchy top is a disease due to a microscopic germ transmitted as already indicated, and no growers who have heard any one of the numerous lectures given in clear language by Professor Goddard, recounting the methods by which this has been proved, have ever failed to recognise that the evidence is 100 per cent. efficient. If anyone who at all doubts the truth of the above will visit the University at Brisbane, they will have the opportunity of having demonstrated to them the production of bunchy top by treatment of healthy plants with aphides transferred from bunchy top plants, and at the same time have the opportunity of seeing all parts of bunchy top plants, from which aphides have been removed, placed on healthy plants or mixed up with the soil in which healthy plants are growing, and having demonstrated to them that in the absence of the aphides the healthy plant will not develop the disease.

Those who are engaged in attempting to protect the banana industry at the present time feel that it is their duty to warn growers against taking notice of some of the wild statements that have recently appeared in the Press.

Work of an elaborate nature is being prosecuted at the present time by Professor Goddard at the University of Queensland in connection with other aspects of the bunchy top problem and at the same time this work is being followed up by experiments in the field.

In conclusion, the Minister earnestly urges all banana-growers to follow out the recommendations made by the Bunchy Top Investigation Committee.

Co-operative Marketing—Standardised Products.

Many persons, when considering the possibilities of co-operative marketing (writes Mr. H. E. Erdman, in a circular of the College of Agriculture of the University of California), are inclined to think in glittering generalities of things a long way off, little realising that some of the most likely fields for activity on the part of their marketing organisations are close at hand. Among those closest at hand are the possibilities arising from standardisation of varieties and from improvement in production.

Members of a co-operative association often resent having the management discuss production. The management, in their opinion, has been hired to sell. It must be remembered, however, that the management is in a position to know what varieties and qualities the market demands, and it should be expected to point out the facts to the membership. Producers do too much experimenting with varieties. Co-operative organisations can do much to bring about standardisation along this line by discouraging the production of the less desirable, and by bringing about the general adoption of a few of the best breeds and varieties.

Co-operative organisations can promote the adoption of those practices which tend to make for standard quality of product in the community. The general adoption of what have been shown to be the best methods of spraying and pruning orchards, for example, should make for uniformity of colour and appearance in the fruit. Already in certain sections of California the spraying and pruning of citrus fruits is done by the co-operative packing associations—largely, it is true, on account of the greater efficiency thus obtained, but also because of the greater uniformity of the product. For similar reasons many of these associations have also undertaken the co-operative picking of the fruit.

In many instances the financial gains from the better standardisation of the product are greater than any possible saving in costs of marketing. One of the outstanding advantages gained by the Danish co-operative creameries in selling their butter on the English market arose from this line of action. Danish bacon offers even a more striking example of planned production. In this case it was discovered that the English trade demanded bacon from a peculiar type of pig. Thereupon the Danes set about by organised effort to produce that particular type.

Another outstanding possibility for co-operative marketing organisations consists in improving and standardising grade and pack. The greater the control of the central organisation over the product, the greater the possibility that a high degree of perfection may be reached along this line. Improving and standardising grade and pack should make marketing more efficient by (a) raising the level of quality of the product; (b) improving its carrying quality; and (c) permitting readier agreement between buyer and seller.

Painting Farm Buildings.

The pigments generally used for the preparation of the colours commonly used in the painting of buildings are as follows:—

Stone-colour: Burnt Turkey umber, raw Turkey umber, yellow ochre.

Drabs: Burnt umber and yellow ochre.

Bufs: Yellow ochre and Venetian red.

Greys: Lamp black, Indian red, ultra-marine blue, vermillion.

Brown: Burnt sienna, Prussian blue, yellow ochre.

Greens: Brunswick greens, dark and light, with blue and chrome yellow.

The white lead is ground to a paste in oil, ready to mix with more oil, &c. (as stated in last week's notes), to prepare it for use. The colouring matter is mixed in a similar way and added to the white lead and oil until the required tint is obtained. The whole is then strained, either through a piece of canvas (usually a piece of chaff bag tied over the mouth of an oil drum), or a fine-mesh wire strainer, the paint being worked through with an old brush. If found to be too thick for immediate use, a little oil and turps may be added. The strainer when finished with should be placed under water to keep it soft and fit for future use. If mixed paint has to be laid aside for a few days, it should be covered with a little water to prevent a skin forming on the surface.

The most useful brushes for ordinary work are the flat type, in sizes from $1\frac{1}{2}$ to 5 inches wide. They may be used for all work, including cutting in around sashes, mouldings, &c., or for painting of broad surfaces, such as weatherboards. New brushes should be set for a few hours in clean water or raw oil before being used. At no time when out of use should they be exposed to the air, but set into clean water, say, 2 inches deep, sufficient to keep the ends of the bristles soft. To clean a dark colour out of a brush so that it can be used in a lighter colour, work it briskly in a little raw oil, which can afterwards be used in other paints. To clean a brush that has been neglected, soak it in hot turps, kerosene, or a strong solution of washing-soda.

See that the surface to be painted is cleaned down—that is, all dust brushed off and anything that requires rubbing down is attended to, either with pumice-stone or glass-paper.

Start at the top and work downwards, so that if any paint falls off the brush it will not injure the finished work. Apply quickly and evenly, leaving no brush marks, and finish with the grain of the wood. If the paint seems to run, it is either too thin or the surface is not clean—probably greasy, if you are painting old work. This should be given a coat of hot lime-wash, and allowed to dry before paint is applied. Always allow one coat to be thoroughly hard and set dry before applying the next.

If doing outside work, select fine weather when neither dust nor flies are about, as nothing makes the painter more annoyed than to have a dust-storm rise when he is applying the finishing coat.

It is a general idea that the first coat should have only a small proportion of white lead in it. It should really be just the opposite, and have rather more than the next coat, because white lead clings to the wood with far more tenacity than any other of the ingredients in paint. The best lead will keep its hold after the oil with which it has been mixed has disappeared, forming the "chalky" surface so familiar on old buildings, fences, or gates.

The following mixture may be used on rough timber, brickwork, or corrugated iron, and will reduce the temperature of houses when applied to the roof equally

as well as the best refrigerating paint sold:—10 lb. of fresh unslaked stone lime; 1 lb. glue; 1 lb. powdered alum.

Slake the lime with hot water, keeping it well covered over during slaking. Dissolve the glue, also the alum, in boiling water, and add to the already slaked lime, taking care not to make too thin. Strain the whole as for paint, and cover over for two days or more, when it is ready for use. Apply with an ordinary two-knot whitewash brush, giving the work two coats, the first to be thoroughly set before the next is applied; and if on roofs or tanks, apply in cool weather. Colouring matter (ochres) may be added if necessary. A little blue improves at all times.

Manuring Grass Land—Phosphatic Fertilisers.

Farming is a business, and the justification for any farming practice is in the financial results, writes Mr. A. B. Adams, in the "Journal of the Department of Agriculture," Western Australia. The farmer who grows wheat uses superphosphate when putting in his crop, as he realises that, except on particularly good soils, all the previous labour—the clearing, cultivating, &c., of the land—would go for little or nothing without a few pounds of superphosphate per acre. It is necessary for the farmer to realise that grass is also a crop, and a crop even more dependent on the addition of substances which are unavailable or deficient in the soil.

In the case of the latter the working and consequent aeration of the soil tends to render unavailable plant-food more available. In the case of permanent grass land the soil becomes for a period more dense and consolidated, and at this stage, which is a critical period in the history of a pasture, there are few, if any, forces at work to make unavailable plant-food available. After a period land under grass improves in texture, as the soil is opened up by the fine plant roots, and when these roots die channels are left in the soil admitting air. With the increased amount of humus and decaying vegetation carbon di-oxide is given off, which in solution in water has a solvent action on some of the otherwise unavailable mineral reserves in the soil.

GREATLY INCREASED CARRYING CAPACITY.

There are no exact figures available of the cash results of top-dressing grass lands in Western Australia, but observation and experiment show that in the areas of heavy rainfall 1 acre of top-dressed land grows from twice to eight or more times as much feed as an acre of similar land not top-dressed. Though the apparent increase is so great, the actual stock-carrying capacity will usually be increased to an even greater extent, as the feeding value of a plant is governed by the soil on which it grows. If the soil is deficient the plant will also be deficient.

In addition to the direct physical and chemical changes in the soil due to the application of phosphoric acid in a form available to plants, it is considered by Dr. Robertson that there is a change in the soil bacteria. Bacteria being a low form of plant life, they are dependent, in common with other plants, on phosphoric acid, and an increase in the amount of this substance present in the soil will tend to cause an increase in the numbers of the soil bacteria, with consequent improved fertility, as a dead soil is an infertile soil.

A further physical effect that has been noted as a result of the top-dressing of grass land is that the soil was kept cooler and clay soil tended to crack less, these effects being due to the increased herbage shading the soil. Over a period these effects can be expected to increase, as the accumulation of humus in the soil will help to retain moisture and also improve the texture of a clay soil.

THE FINANCIAL ASPECT.

The cost of superphosphate as an annual application frightens many from top-dressing more than a limited area each year, but in a great many cases the amount required to purchase manure will be less per acre annually than the interest charge on the cost of clearing, previous cultivation, &c.; therefore, if it was good business to outlay capital in clearing, it is much better business to spend an annual amount which will probably amount to less rather than more than the interest on first cost, when by so doing such a much greater return is to be obtained. Further, if the land is regularly top-dressed, not only will an immediate return be obtained in increased stock-carrying capacity, which will probably pay some (if not all) the interest charge on previous capital expenditure, as well as the cost of the manure, but there will also be a resultant steady improvement in the quantity and quality of feed on the area. Failure to fertilise will just as surely lead sooner or later to a run-down pasture, unthrifty, poorly grown stock, and unsatisfactory financial returns.

Increasing interest is being taken in the subject of pasture improvement in Queensland, where experience has amply supported the argument in the foregoing paragraphs—that manuring of pastures pays.

Farm and Garden Notes for November.

FIELD.—Farmers are commencing to realise that quick-maturing wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growth fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kafir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghum have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COASTAL DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for

bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young pawpaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit, it appears to be covered with a grey dust, and if the fruit is examined with a good lens it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruit that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruit profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully, and, on its first appearance in a district, all ripening fruit should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead; and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

PEANUT GROWING—PREPARATION AND PLANTING.

Peanut seed for planting may consist of—(a) unshelled nuts, (b) nuts broken in half, (c) shelled nuts (kernels). Of these three, the last is the most desirable, for although it is not essential to plant shelled seed, the practice of sowing in the shell cannot be recommended for the following reasons:—

1. Planting whole peanuts will result in a slow and irregular germination, particularly if conditions are dry at seeding time. This will mean later maturity, which is undesirable.

2. With varieties such as Valencia, which contain three to four kernels, the seeding would be far too heavy.

3. Immature, diseased, damaged, and poorly developed kernels cannot be discarded.

4. There is uncertainty of obtaining a good stand.

5. There is greater expenditure of seed.

If a planter is used for sowing, it is essential to use only shelled nuts.

In the case of the small-podded varieties, such as White Spanish, shelling is not so necessary, for if good seed is selected the pods will invariably be found to contain sound, well-developed kernels. There is little danger of overcrowding, as this variety requires much thicker seeding than some of the later and more vigorous types. Sometimes pods containing only one kernel are graded out and reserved for sowing. Another method is to break in half the pods containing two kernels. This method is quick and effective, and has the advantage of saving considerable time, although it will not give results equal to the shelled seed. When unshelled nuts are used they may be soaked for a few hours previous to planting, so as to encourage a more rapid germination, provided they are to be planted in a moist seed-bed. This practice must not be adopted when kernels are planted, as there is a danger of considerably damaging the seed.

Shelling should be delayed until as late as possible before planting (two or three weeks), since less damage is likely to be done to the kernels and a better germination will be obtained. If reasonable care is taken in preparing the seed for planting there will be no difficulty in obtaining a good germination. Hand-shelled seed, although the operation is a somewhat slow and tedious one, is superior to machine-shelled seed. Machines have a tendency to damage or bruise the kernels, causing rotting in the ground of kernels otherwise sound.—A. and P. Notes, N.S.W. Department of Agriculture.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1926.	SEPTEMBER.		OCTOBER.		MOONRISE.	
	Rises.	Sets.	Rises.	Sets.	SEPT.	OCT.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.8	5.36	5.34	5.50	a.m. 1.39	a.m. 2.9
2	6.7	5.36	5.33	5.51	2.35	2.53
3	6.6	5.37	5.32	5.52	3.24	3.31
4	6.5	5.37	5.31	5.52	4.9	4.7
5	6.4	5.38	5.29	5.53	4.53	4.40
6	6.2	5.38	5.28	5.53	5.31	5.9
7	6.1	5.39	5.27	5.54	6.6	5.44
8	6.0	5.40	5.25	5.54	6.39	6.16
9	5.59	5.40	5.24	5.55	7.9	6.44
10	5.58	5.41	5.23	5.55	7.43	7.24
11	5.57	5.41	5.22	5.55	8.14	8.4
12	5.56	5.42	5.22	5.56	8.47	8.46
13	5.54	5.43	5.21	5.56	9.23	9.36
14	5.53	5.43	5.20	5.57	10.4	10.30
15	5.52	5.44	5.19	5.57	10.50	11.28
16	5.51	5.44	5.18	5.58	11.41	12.26
17	5.50	5.45	5.17	5.59	p.m. 12.39	1.39
18	5.48	5.45	5.16	5.59	1.43	2.45
19	5.47	5.46	5.14	6.0	2.49	3.52
20	5.46	5.46	5.13	6.1	3.58	4.57
21	5.45	5.46	5.12	6.1	5.7	6.13
22	5.44	5.47	5.11	6.2	6.15	7.9
23	5.43	5.47	5.10	6.2	7.20	8.13
24	5.42	5.47	5.9	6.3	8.26	9.13
25	5.41	5.47	5.8	6.4	9.30	10.16
26	5.40	5.48	5.8	6.4	10.32	11.9
27	5.38	5.48	5.7	6.5	11.32	nil
28	5.37	5.48	5.6	6.6	nil	a.m. 12.5
29	5.36	5.49	5.5	6.6	12.28	12.50
30	5.35	5.49	5.4	6.7	1.21	1.30
31	...	...	5.4	6.8	...	2.8

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

7 September ● New Moon 3 44 p.m.
 15 „ ☾ First Quarter 2 26 p.m.
 22 „ ○ Full Moon 6 19 a.m.
 29 „ ☽ Last Quarter 3 47 p.m.

Apogee, 7th September, 6 24 a.m.
 Perigee, 21st September, 4 18 p.m.

On the 19th of September a conjunction of the Moon and Jupiter will take place about a quarter of an hour before the Moon rises at Warwick. It will, however, afford an interesting daylight spectacle soon after 3 o'clock in the afternoon when the planet should be seen to the left of the Moon, apparently at a distance of less than four times the diameter of the latter from the planet, although many millions of miles will actually separate the two objects.

Delta Capricorni will be occulted by the Moon on the 19th in Southern Queensland. About 9.30 p.m. the star will appear a little to the right of the Moon, which will obtrude itself between the star and the earth, a few minutes later. About 10.10 the star will again be seen on the opposite side of the Moon, low down to the left. The Moon being nearly full, binoculars or a telescope will be necessary to observe this occultation.

The beautiful planet Venus will no longer be such a brilliant object in the morning sky, as it will not rise until a few minutes after 5 each morning during the month, and the Sun will be rising only half an hour later at the end of the month, and it will be practically lost in the approaching daylight.

7 October ● New Moon 8 13 a.m.
 15 „ ☾ First Quarter 12 27 a.m.
 21 „ ○ Full Moon 3 15 a.m.
 28 „ ☽ Last Quarter 8 57 p.m.

Apogee, 4th October, 11 12 a.m.
 Perigee, 20th October, 1 0 a.m.

October.—Mercury will rise 28 minutes before the Sun on 1st October, on the 15th at 1.18 before the Sun, and on the 31st at 1.49 before the Sun.

Venus will rise at 5.9 minutes before the Sun on 1st October, on the 15th at 7.55 p.m., and on the 31st at 6.26 p.m.

Jupiter sets at 3.12 a.m. on 1st October, on the 15th at 2.15 a.m., and on the 31st at 1.21 a.m.

Saturn sets at 9.13 p.m. on 1st October, on the 15th at 8.27 p.m., and on the 31st at 7.32 p.m.

An interesting spectacle may be seen on the evening of the 22nd when the Moon, rising soon after 7 o'clock, will appear to be attended by the planet Mars, which will seem to be about five or six times the diameter of the Moon to the north of it. Both objects will be in parts of their orbits, which bring them nearer than usual to the earth. The Moon will be at a distance of something like 230,000 miles, and the planet at the much greater distance of about 235 millions of miles.

No occultation of any popular importance will occur during this month, and most of the other phenomena either occur in the daytime, when unobservable, or are of little popular interest.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

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PART 5.

Event and Comment.

The Current Issue.

The November Journal covers a wider range than usual, and beside the working and field notes that are usually featured it contains some valuable information on current topics that will be welcomed readily by our readers. A notable contribution to the recent debate on the Primary Producers' Organisation and Marketing Bill, which has since become law, was made by the Minister in charge of the measure, the Hon. W. Forgan Smith, and his Second Reading Speech is presented. Some methods of countering the effects of dry seasons are discussed by Mr. Gibson and Mr. Clydesdale; the principles of Tomato Culture are set out by Mr. Benson; and Mr. Veitch has a note on an important Queensland insect pest. Departmental work in maize improvement is described by Mr. McKeon, while Mr. Clydesdale has added some useful working notes on wheat and pasture improvement. Mr. Shelton discusses among other matters the Poland-China pig, and Mr. Rumball contributes a note on the causes of distended abdomen in poultry. Mr. Mobsby has an interesting report on his work at the New Zealand and South Seas Exhibition. A new contributor, Mr. Davies, has a brief note on irrigation as practised on a farm near Miles. Entomological notes by Mr. Edmund Jarvis, and other sugar features are well supplied. Among selected matter is a striking article on the suitability of tropical Queensland for white habitation by Dr. Elkington, and a note on new cotton laws in California. Altogether this month's Journal is a very readable number.

Improving the Conditions of the Pastoral Industry.

At the instance of the Premier (Hon. W. McCormack) a committee of scientists and experts has been formed for the purpose of investigating thoroughly all phases of wool production, including land settlement, water conservation, land rentals, transport problems, fodder conservation, sheep-breeding, and pests, and carrying out all related research work. In its operations and inquiries, where common interests are concerned, the committee will work in conjunction with the Commonwealth Institute of Science and Industry. The activities of the committee should have an important influence in improving the general conditions of the pastoral industry.

Fat Lamb Raising.

At the recent Triennial Husbandry Conference in Sydney, consideration was given to many valuable suggestions for improving the conditions of the stock-raising industry. Fat lamb-raising was among the matters discussed, and the question was propounded as to why we cannot compete with New Zealand and Argentina in fat lamb export. It was pointed out that in New South Wales, and the contention applies with equal strength to Queensland, there is some of the finest fattening country in the world with a mild winter and, in normal seasons, good grazing conditions. It was contended that, provided we can produce early lambs, there is a period of two months in the markets of Great Britain when first lambs will command a ready sale. The success of the New Zealand farmer in this line of industry has been due to specialisation, and the need for specialisation is just as great here as for wool-growing. A hopeful sign is that small graziers and farmers are fully alive to the fact that quality in the product is an essential. The suitability of the wheat belt for lamb-raising below the Border has been demonstrated again and again, and the same applies to the grain lands of Queensland. At the last Parkes (New South Wales) Show there were some wonderfully fine pens of well-bred suckers suitable for export, fattened under natural conditions and brought direct to the pens from the paddock. In the class for the Border Leicester cross there were nine entries, and not one sucker would dress under 50 lb. Possibly most of them were too heavy for the export trade, but the weights—their ages were from four to five months—were so extraordinary that they have probably not been exceeded in Australasia. The test was severe, as the suckers had been off the grass for three days, and weights were averaged. Some individual weights are eloquent. One of Border Leicester-Comeback fusion dressed 61 lb. from a live weight of 107 lb. Another of the same cross scaled 58 lb. and 100 lb. respectively. A Border Leicester-Merino dressed 57 lb. Other weights were also unusually good considering the age of the lambs. At the Conference the policy of holding the increase of good seasons only to lose it in a dry time was declared to be unsound, and exports are not responsible for any serious flock reduction. In New Zealand sheep totals are kept on a safe level by exporting the yearly surplus. As the necessity of fostering the export market is recognised, organisation and continuity of supply must fitly follow. Taking a general view of things, and allowing for seasonal caprice, there seems to be no reason why Queensland should not add greatly to her wealth by developing further along sound lines—fodder-growing and conservation is naturally predicated—this branch of our live-stock business.

Herd Testing.

The Minister for Agriculture (Hon. W. Forgan Smith) has informed the Press that as a result of representations made by the Queensland Government and others the Federal Government had decided to give financial assistance to associations and State Governments which are carrying out the work of herd testing. In Queensland this work has been performed by and at the sole cost of the Department of Agriculture and Stock. Under the scheme proposed by the Federal Government this State will receive financial assistance for herd-testing services at a rate of 2s. per cow submitted to a butter-fat test. Continuing, the Minister expressed pleasure at being able to make this announcement, for it will enable this State to continue a beneficial service to dairy farmers. It is also gratifying to note, he added, that dairy

farmers generally are taking a keener interest in herd testing, and last year approximately 16,000 milch cows were submitted to a butter-fat test under the departmental herd-testing scheme. He felt confident that by a comparatively small personal effort on the part of the dairy farmer it would be practicable to double the production of the dairy herds in this State. Every dairy farmer should arrange to submit his herd to the butter-fat test and, where necessary, give increased attention to the mating of the cows with the right class of bull. Effort along these lines would result in placing the dairy industry in a much more satisfactory position than at present exists. Under the "Better Bull Scheme," inaugurated by the Queensland Government, provision is made to afford financial assistance to dairy farmers desirous of purchasing an approved dairy bull. The scheme provides that a subsidy will be given for this purpose on a £1 for £1 basis up to an amount not exceeding £50. The Minister added that to his mind the improvement of the productive capabilities of the dairy herd is a natural corollary to herd testing, and this can be effectively achieved by the infusion of improved strains into dairy herds. In this connection he hoped that the Commonwealth Government would be prepared to give consideration to the matter of granting a subsidy for the purpose of the purchase of approved stock for inclusion in dairy herds with a view to generally increasing milk and cream production.

What is Marketing ?

Marketing is something more than mere barter, the mere offering of goods for sale. Used in its widest sense the term covers sales organisation, high standards of products and maintenance of quality, output control, utilisation of surpluses, manufacture of by-products, grading, and packing. To regard marketing as just bargaining, and to rely on a more or less inadequate organisation as a solution of the producer's present problem of securing a fair return for his energy and enterprise, is an unsound policy—unsound because it is incomplete. There must be organised effort to regulate the supply to the demand and to stimulate demand to the volume of the supply. The regulation of supplies is the more important factor of the two in the maintenance of price levels. The stimulation of demand is also necessary, of course, though a much slower process than the other. Queensland farmers have already awakened to the necessity of improved methods of organisation which are being followed, too gradually perhaps, by the elimination of waste in marketing and the promotion of orderly distribution. Large fluctuations in production are not in the interests of either the producer or the consumer, and farmers' organisations in this State are already at work towards reducing the risks of market gluts and minimising the losses that they entail. Though much has been done—little more than spade-work actually—there is yet much more to do, particularly in respect to market organisation. The aim should be to secure a steady flow of products in a measure sufficient to supply an increasing demand at prices that will return the farmer a decent wage and a fair margin besides. Consumers must be prepared to pay prices for farm products that cover the cost of economical production and allow a return fair enough to enable the efficient producer to maintain satisfactorily good living standards.

The Pooling of Brains.

A closer study of the economics of agriculture is becoming an urgent need. It is plain that the prosperity of the industry depends as much upon sound business methods as upon sound field practice and scientific animal husbandry. Accurate knowledge of the cost of production, farm organisation, land utilisation, and business co-operation has, it is clear, a most important bearing on the farming industry. In making any change in marketing methods keen opposition is bound to be encountered, and the importance of appointing men of ability and integrity to directive and administrative positions in farmers' marketing enterprises cannot be stressed too strongly. Competency, character, and driving force should be looked for as a matter of course in farmer leaders. In the market place ability must be matched with ability. If we are prepared to pool our interests in industry what is wrong with pooling our brains?

RURAL ORGANISATION.

MARKETING OF PRIMARY PRODUCTS.

MINISTER'S SECOND-READING SPEECH ON THE NEW AGRICULTURAL MEASURE.

The Bill now before the Legislative Assembly for the purpose of consolidating existing Acts of Parliament, which have been of advantage to the primary producers of Queensland, has aroused much interest among the farmers of this State. The principal Act of 1922 was a comprehensive measure intended to organise primary producers in Queensland, bestowing on them certain co-operative powers of organisation and marketing. At its inception that measure dealt with a somewhat difficult situation. Its objective was in the direction of securing a complete organisation throughout Queensland, culminating in the Council of Agriculture, which was given very definite functions. In addition to that, the Primary Products Pools Acts laid down a basis whereby agriculturists could co-operate with a view to securing control over the commodity which they produced, the object being to carry out certain functions which could be of benefit to them. These objects were not only designed to be of benefit to the producers of the commodity, but, by stabilising prices and securing control generally throughout those industries, it was hoped that waste would be eliminated and improved marketing conditions result.

The Government policy is to establish agriculture as a prosperous industry, so that the countryside, as a rural society, may enjoy the opportunities and amenities which are the moral right of a nation's citizens.

Subjoined is the full text, taken from "Hansard," of the second-reading speech of the Minister (Hon. W. Forgan Smith) on the new measure which is of particular interest to our readers.

The SECRETARY FOR AGRICULTURE (Hon. W. Forgan Smith): The problem before agricultural producers is chiefly one of marketing rather than of production, as the latter question has received and is still receiving considerable attention. A great deal has been accomplished in the matter of production, and that work is being pursued steadily by the several Departments of Agriculture throughout Australia, and by the several associations which bring to their work scientific organisation and research with a view to improving production on that side of the business.

It is not enough to produce a commodity. That is only one part of the problem. When it is produced it is necessary that it be marketed properly, having regard to the interests of those engaged in its production and to the interests of those who will finally use that product.

Advantages of Co-operation.

Farmers as a group prior to the passing of these measures were acting, for the most part, as individuals, and as independent units they could do little to bring about improvements in the process of marketing. It is only through concerted action that farmers can strengthen their position and stabilise their business. It is a recognition of those facts that has caused the Government to bring into being co-operative organisations in order that its policy can be given expression to. The doctrine of co-operation is not an untried theory. It is something which has been demonstrated as a practical policy, and one which can be extended in various ways with advantage to all concerned. In the primary producing side of industry in Queensland we have developed co-operation to a considerable extent, and in various primary industries co-operative production and marketing is now the established policy. One only needs to look into the records and experience of various co-operative companies in Queensland to realise the advantage of such organisation not only

to themselves but to the industry, and through the industry to the State as a whole. The Acts of which this Bill is a consolidating measure further extend the principle of co-operation and deal more particularly with marketing. Co-operation as a principle by itself does not accomplish anything. There is no means of laying down a principle and assuming that that principle accomplishes anything of itself. Co-operative effort, to be successful, must be carried on efficiently. Those engaged in co-operation must understand their aims and objects and must carry out their functions in a manner which will bring about better results than the conditions of industry which they seek to displace.

What Co-operation Is.

In that connection Mr. Lloyd S. Tenny, Chief of the Bureau of Agricultural Economics at Washington, has this to say—

“In organising a co-operative marketing association the farmer is not creating an agency that will automatically solve his marketing problems, nor one that is endowed with any supernatural powers. The organisation is nothing more than he and his neighbours working together to do those things which they can accomplish better collectively than as individuals. In moving a product from the farmer's field to the consumer's table certain services must be performed. Can the farmer perform those services more effectively through his organisation, or can they be performed better by private middlemen? Attention to this problem will enable students of co-operation to escape the error of thinking of co-operative organisation as an end in itself.

“The first essential of successful co-operation is that there must be a definite object in view; the organisation must perform a definite service or services. Furthermore, it seems to function more satisfactorily when based on a single commodity or a group of closely related agricultural commodities. Then it must have sufficient business; it must have good management, and finally, it must have a loyal and informed membership. There is no magic in co-operation. It is an attempt by the farmer to solve his own problems, and that means that it will succeed only to the extent that he exercises forethought and judgment. This does not mean that a farmers' organisation should not employ experts to handle the details of his business, but it does mean that in the long run the movement cannot advance any farther than the farmers themselves are able to carry out. For this reason we are all concerned with co-operation as an educational factor. If the farmers learn through the operation of their co-operative organisations something of the economic factors that directly affect them, if they gain in ability to analyse and to evaluate those factors, then much may be expected in the way of permanent improvement through co-operation. Co-operation means working together, profiting by mistakes, and becoming stronger through experience. The form of co-operation which will be of permanent value to the farmer is one which he himself controls and which enables him to learn better business methods and gain a better understanding of his problems.”

That quotation from this Professor of Economics at Washington sums up very succinctly the whole position as it affects us in Queensland. Here we have laid down what may be defined as an agricultural code, having for its purpose the building up of agriculture in this State on an efficient basis with a view to giving the best results to those engaged in primary production. Thought along these lines has pursued various channels in different countries, yet it is becoming more and more impressed upon the legislatures of civilised communities that the conditions of producing the essentials of life necessary for human well-being demand further consideration than has been the case in the past.

“Any Parliament or any individual seeking to deal with society as a whole, having regard to the economic evils that exist at the present time, must have as a starting point a sound agricultural policy that will not only provide for the needs of the people but will provide also that those engaged in the production of the essentials of life shall have a decent standard of living in order to maintain themselves and their dependents.”—Hon. W. Forgan Smith.

Country Life must be Made more Attractive.

The SECRETARY FOR AGRICULTURE: The farmer produces in many cases without any foreknowledge of his marketing conditions. When products are plentiful, when nature has been kind, we often find glutted markets, resulting in losses to those engaged in production, and it would seem that on occasion, due to faulty methods of organisation within a State, the general public are denied the advantages of bounteous Nature. I think everyone in Queensland will agree as to the principle that life for the man engaged in production must be made more attractive than it has been in the past, and that a man upon the land engaged in producing the essentials of life, assuming that he is reasonably industrious and efficient, is entitled to a decent standard of living for himself and his dependents. All social organisation must therefore have its starting point in laying down a sound agricultural policy.

Any Parliament or any individual seeking to deal with society as a whole, having regard to the economic evils that exist at the present time, must have as a starting point a sound agricultural policy that will not only provide for the needs of the people but will provide also that those engaged in the production of the essentials of life shall have a decent standard of living in order to maintain themselves and their dependents.

Problems of Marketing.

The immediate problems in marketing organisation can be summed up, I submit, in the following ten points:—

1. Standardising and improving production;
2. Standardising and improving grade and pack;
3. Stabilising production;
4. Controlling flow to market;
5. Improving distribution between markets.
6. Advertising and the developing of new markets;
7. Collective bargaining;
8. Financing of marketing operations;
9. Making marketing more efficient;
10. Maintaining favourable public relations.

Those ten points sum up the problem confronting not only the Government but organisations called into being by this and other Acts that we from time to time place upon the statute-book. No Parliament, no Government, can do these things of their own volition. They can only be accomplished by the intelligent co-operation of the individuals engaged in these industries, and the application of trained minds to these problems and the calling into being of organisations whose duty it will be to solve and deal with these problems.

In Queensland we have a Primary Producers' Organisation, with the Council of Agriculture as the chief mouthpiece of that organisation. It may be said that that organisation as constituted at the present time leaves much to be desired. It has been criticised from various standpoints by individuals not altogether interested in seeing that agricultural organisation is a success.

Organisation on a Commodity Basis.

The SECRETARY FOR AGRICULTURE: It has also been criticised by people who desire to see agricultural organisation placed on a proper footing. Last year we introduced an amendment of two Acts. That legislation laid down the basis of organisation on a commodity basis. The Council of Agriculture as then constituted was fairly divided on the question, and, as a result, having regard to the principle that men have a right to a voice in the conduct of their own affairs, a compromise was effected by constituting the Council of Agriculture from representatives of commodity boards and representatives of district councils.

When that reorganisation took place my original intentions were the only ones which appealed to me as being sound. An organisation composed of different units such as I have described has proved in operation to be lopsided. You have the position of growers of two-thirds of the products of Queensland being represented by commodity boards and one-third being represented by members of district councils.

In addition to that, bearing in mind that the chief function is successful marketing, I hold that the commodity boards, which are composed of men many of whom are engaged in marketing already and are directly responsible for the successful conduct of their businesses, are the proper bodies to have the supreme control of this organisation. However, be that as it may, this organisation had to be established. We had no experience to guide us as to the lines we should take, and I am satisfied that the Government proceeded along the lines which were best at the time, and that, as a result of what has been done since the inception of the first measure in Parliament, we are able to-day to lay down a basis which will be of a permanent character, and

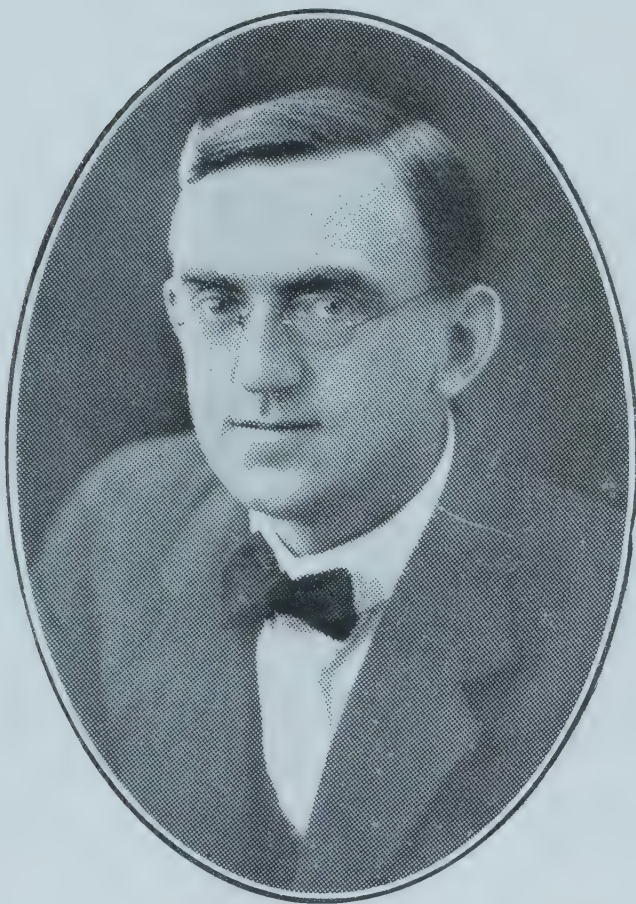


PLATE 82.—HON. W. FORGAN SMITH, MINISTER FOR AGRICULTURE.

which, if used properly and effectively by the organisation itself, will do much to permanently stabilise and improve the conditions of the people in this industry. Agricultural organisation, I repeat, is something that should be encouraged by any Government. We know that these are days of organisation, when every interest in the community is organised to the hilt and able to protect its own interests. It is unfortunate that in the direction of organisation much leeway has to be made up by agriculturists in Australia.

The Lessons of Denmark.

Sir H. Rider Haggard, in dealing with this problem in his very interesting book, "Rural Denmark and its Lessons," has this to say—

"Now let us pass to the indirect but equally tangible results of co-operation. First of these I should be inclined to put the development of mind and character among those by whom it is practised. The peasant or little farmer who is a member of one or more of these societies, who helps to build up their success and enjoys their benefits, acquires a new outlook. His moral horizon enlarges itself, the jealousies and suspicions which are in most countries so common among those who live by the land fall from him. Feeling that he has a voice in the direction of great affairs, he acquires an added value and a healthy importance in his own eyes. He knows also that in his degree and according to his output, he is on an equal footing with the largest producer and proportionately is doing as well. There is no longer any fear that because he is a little man he will be browbeaten or forced to accept a worse price for what he has to sell than does his rich and powerful neighbour. The skilled minds which direct his business work as zealously for him as for that important neighbour. Again, being relieved from all the worry and risk of marketing, he is free to devote himself altogether to the actual business of his life. Lastly, by means of its elimination of expense and by its large dealings, co-operation makes enterprises which are often enough unprofitable individually very profitable collectively. Once more it exemplifies the truth of the Greek fable of the single stick and the fagot, or of the motto of the old South African Republic, 'Union is Strength.' The farmer who standing alone can be broken across the knee of tyranny, extortion or competition, if bound up with a hundred others by the bond of common interest, is able to mock them all. This advantage, too, remains to him: as co-operative societies guarantee the quality of their produce, his market is always sure. In short, co-operation is the real solution of the difficulty so often experienced of making properly farmed but unprotected land pay a living profit and something over for rent or interest on loans invested, with a margin for sinking fund or savings."

I think that quotation sums up the situation very effectively, and contains a lesson which all those engaged in these industries in Queensland should take seriously to heart.

The Farmers' First Line.

I have mentioned that this Bill deals with organisation purely on a commodity basis. The local producers' associations will form the first line of organisation of the farmer. He can form his local organisation to carry out work in his interests. Commodity boards under this Bill may be established either for marketing purposes or without marketing functions. They will be elected directly by those engaged in the production of the commodity concerned. That is to say, the dairyman will be the elector of the butter board, the sugar-grower will be the elector of the sugar board, and so on; so that you will have organisations based on mutual interests representative of and elected by those engaged in the production of the commodities concerned, and those boards in turn will each elect one of their number to be a member of the Council of Agriculture.

Hon. members will see, therefore, that under the new organisation the Council of Agriculture will be an executive comprising the commodity boards concerned. No Government nominees will be on the Council, as at present, and the Secretary for Agriculture will not of necessity be president. In other words, the Council of Agriculture will be composed, as I have said, entirely of representatives of commodity boards, with the Director of Marketing acting as a liaison officer between the commodity boards, the Council of Agriculture, and the Government.

In that connection, I wish to draw the attention of hon. members to the fact that certain persons are endeavouring to serve party interests by making reference to Government nominees on the Council of Agriculture as constituted at present. Everyone who has an intimate knowledge of the work of the Council of Agriculture recognises that the Government nominees have been of incalculable value in the building-up of this organisation.

The Secretary for Agriculture: They are men of wide experience in their various fields of activity, and their efforts have been highly prized by the men who comprise the Council of Agriculture itself, and the council and a conference of commodity boards have both affirmed, not only the principle of Government nominees, but also the desirability of the Secretary for Agriculture being their president. That is a

complete reply to those individuals who have endeavoured to depreciate some of the advantages and undermine the authority of the Council of Agriculture by seeking to create dissension in this respect. It is no longer necessary to have members of my staff on the Council of Agriculture. Under the new organisation the council will be comprised of men who have certain duties to perform and certain responsibilities. They will have access to the Minister as at present. I am pleased to say that my relations with the commodity boards have always been of the most cordial character, and I have no doubt that will continue, and that interviews of mutual advantage will continue to take place. The services of officers of the department who have expert knowledge in various spheres of activity will be availed of in a consultative capacity in any direction desired.

Abolition of District Councils.

The Bill abolishes district councils. With the building up of commodity boards and the extension of marketing functions, I have come to the conclusion that district councils are no longer necessary. In the early stages of development they carried on much organisation work and performed a great deal of good service to the people they represented; but they, in turn, must give way to a better and more progressive organisation. They have served their purpose. We can discontinue them, and save the expense that is now entailed by their maintenance.

The Power of Commodity Boards.

The commodity boards under the new legislation may be constituted on practically the same basis as pool boards are now constituted under the Primary Products Pools Act. The commodity boards will have power to levy for the following purposes:—

1. For administrative expenses.
2. Paying the precept to the Council of Agriculture.
3. In establishing an insurance fund.

The power that the Council of Agriculture now has to levy on produce will be abolished. The commodity boards will have the same power to levy on their produce; they, in turn, supplying their quota by means of precepts for the maintenance of the Council of Agriculture. I consider that a very desirable method of financing their operations, because it provides for greater control than any indirect system. Where the commodity board is directly responsible to its own members for the levying of sums of money for carrying on its organisation and for the manner in which the funds are expended, there will be provided administrative control of finance, which will be to the interest of all concerned. A levy for an insurance fund or any special purpose will be subject to a poll of those concerned. That is to say, for administrative expenses and for paying precepts to the Council of Agriculture the commodity board will have power to make a levy; but with respect to any levy for a special purpose, such as a provision for insurance against various contingencies or for any purpose that may be considered advisable by the board, the growers concerned will have the right to demand a poll before that levy can be made.

The establishment of a pool and the conferring of marketing functions will be decided by a two-thirds majority. The existing pool boards will continue to function as at present.

The Functions of the Council of Agriculture.

There will be some alteration necessary in the functions of the Council of Agriculture. Its duty will be to co-operate with the Department of Agriculture, the local producers' associations, and other bodies in—

1. Developing the rural industries.
2. Advising upon matters to the interest of primary producers.
3. Advising the Minister upon matters he may refer to the council.
4. Advising upon matters brought before the council by associations or boards.

Finance.

The Council of Agriculture will be financed by the issue of precepts upon the Commodity Boards, and will meet annually and on such other occasions as the importance of the business may demand. A grant of £15,000 is made in this Bill as a final grant to this organisation by the Government. After this year no further payment will be made by the Government, and the organisation will be made entirely

self-supporting. In that connection it is interesting to note that since the inception of the organisation up to 30th June, 1926, the Government have assisted the Council of Agriculture to the extent of £95,981. The amounts available to the Council during that period are:—

	£
Grants by the Government	95,981
Levies raised by the Council, 1924-25	20,884
Levies raised by the Council, 1925-26	25,259

The total sum raised by means of levies was £46,143, which, added to the subsidy granted by the Government, gives a total of £142,124. With the £15,000 that I have referred to as being provided under this Bill, and on the basis that a levy collected during the present financial year will approximate the amount raised last year in this way—namely, £25,259—by the end of June, 1927, the Government will have subsidised the Council of Agriculture to the extent of £110,981 against £71,402 raised by levies.

The Sugar Industry.

The Bill also provides for the maintenance of the existing organisation in the sugar industry. It will be remembered, Mr. Speaker, that for some time there have been various forms of organisation in the sugar industry. That is one industry which is in a highly organised condition and can deal with its problems effectively by means of the organisation that has been built up. The Bill provides for the carrying on of that organisation, which is based as follows:—

1. A mill suppliers' committee for each individual sugar mill;
2. District cane growers' executives to deal with the business of each sugar district;
3. A Cane Growers' Council elected by the whole of the sugar industry of Queensland.

Provision is made whereby any primary industry may adopt a similar system of organisation, with, of course, such modifications as may be deemed necessary or desirable to meet its peculiar circumstances.

"I look to the producers of this State to study carefully the problems which affect their own interests and act accordingly. There is no Messiah in the agricultural industry or in the Department of Agriculture who can bring about reform and bring about permanent benefits to this industry. Producers must develop those powers of organisation and the successful marketing of their produce for themselves. In proportion to the intelligence with which they build up this organisation, and in proportion to the loyalty with which they support their own organisation, so will benefit accrue to themselves and the agricultural industry of Queensland be advantaged."—Hon. W. Forgan Smith.

A Director of Marketing.

The Bill provides for a Director of Marketing. He will be a Government officer. He will co-operate with the various Commodity Boards in securing effective marketing conditions, and will act as a liaison officer between the Government and these Commodity Boards.

The Commodity Boards under the scheme will have far-reaching powers. The boards will have control and authority in various directions, but that control and authority is subject to approval by regulation of the Governor in Council. It is desirable for that and many other reasons which are apparent to have this liaison officer, who will conduct business as between the boards and the department, and at the same time give the value of highly specialised services to the Commodity Boards of which ex officio he shall be a member. His salary will be paid by the Government. It will be a charge on consolidated revenue, although the boards will be called upon to pay him the same fee as is prescribed to members of Commodity Boards generally. That fee will be payable from the funds of the Commodity Board, and will be used towards the payment for his services. That briefly describes and defines the organisation on its new basis.

Other Legislation Affected.

The Bill also deals to some extent with other Acts that affect rural organisation. It deletes from the Fruit Marketing Organisation Act, the Stallions Registration Act, and the Agricultural Bank Act, the mandatory clauses which make it necessary for the Governor in Council first to secure the approval of the Council of Agriculture on certain matters of administrative detail. That method has been found in actual practice to be cumbersome and quite unnecessary. Any Commodity Board which desires regulations can easily approach the Minister for them; but, on the other hand, the Minister should not be in the position of having to approach such an organisation for a recommendation to carry out the functions of his office or the functions which properly belong to the executive government of the State.

Also, in connection with the Committee of Direction of Fruit Marketing, the Bill makes it clear that the referendum to decide whether or not the Committee of Direction shall continue is to be decided by a majority of the fruitgrowers actually affected. There is some obscurity about the matter, and this Bill makes it clear that, in the event of a vote being taken for the continuance of the fruit marketing organisations, all fruitgrowers shall be entitled to a vote, and the matter shall be decided on a vote pro or con of those participating in that ballot. That is a fair and reasonable proposition.

Provision is also made that other ballots shall be carried out by the Department of Agriculture. That is the desire of the Commodity Boards themselves, and is a policy of which I heartily approve. If a vote is being taken, say, for the continuation of a pool, it is much better that those connected with its operations should not be liable to the charge that they control the vote for their own continuance. In their interests and in the interests of the public, it is desirable that a body not affected by the vote should control such matters.

I think I have said enough to define the aim, purpose, and scope of this measure, which I believe will provide the basis of a successful organisation of agriculture in Queensland. It will also enable that organisation to be fixed permanently on a basis which will give good results.

I look to the producers of this State to study carefully the problems which affect their own interests and act accordingly. There is no Messiah in the agricultural industry or in the Department of Agriculture who can bring about reform and bring about permanent benefits to this industry. Producers must develop those powers of organisation and the successful marketing of their produce for themselves. In proportion to the intelligence with which they build up this organisation, and in proportion to the loyalty with which they support their own organisation, so will benefit accrue to themselves and the agricultural industry of Queensland be advantaged.

OUR INDIAN HORSE MARKET.

The Minister for Agriculture (Hon. W. Forgan Smith) informed the Press recently that he had received an intimation from the Prime Minister of the Commonwealth to the effect that the Indian Government had stated definitely that, whatever may be the future of horse breeding in that country, it was safe to say that India will require to purchase riding and draught horses from Australia for many years to come. It is obvious, of course, that the Government of India cannot give a definite guarantee as to the precise number of horses that will be required from year to year. The number needed would depend upon factors which cannot be definitely foreshadowed. It is, however, anticipated that the requirements of the army in India are not likely in the immediate future to fall short of 1,000 cavalry and 1,000 draught horses per annum. The breeders of horses in this State should not lose sight of the Indian market. Because of its geographical position Queensland is favourably situated, and with close attention to breeding the type of horses suited for army purposes this State should be able to secure the whole of the trade and provide the full requirements of the Indian army in horse flesh.

It is asserted that owing to the decline of the industry here a large number of horses produced by the breeders in Australia have to be rejected as unsuitable for military requirements in India, and Mr. Forgan Smith expressed the hope that this is only a passing phase and that every effort will be made by breeders here to maintain the high reputation credited to Australian horses.

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has made available the following report from the Southern Assistant Entomologist (Mr. R. W. Mungomery) for September, 1926:—

The Soldier Fly and its Association with Cane.

A visit was paid to the Mackay district, primarily with the object of carrying out further investigations in connection with the larvæ of the soldier fly, *Metoponia rubriceps*, Macq., which has been found attacking cane in the vicinity of Finch Hatton. This pest is one of the minor cane pests, and for some unknown reason it has been made to assume a much greater role than its present economic position in regard to the sugar industry warrants. From the point of view of the economic entomologists, its association with cane was of interest and of scientific importance, and was first recorded by Mr. E. Jarvis (see "Queensland Agricultural Journal," 1st August, 1925, page 100). However, without the instigation of the entomological staff, there appears to have developed in some of the growers a feeling akin to fear for this pest, which is out of all proportion to the damage it occasions. Probably on account of its limited occurrence accounts of its damage are circulated from one individual to another, augmented at each step, until one hears reports of its destruction which are by no means indicative of the true economic position of this insect. Whether this latter explanation be correct or otherwise, I would like to stress at the outset, that from my observations this year and from information of previous damage, I think the position of this fly in its relationship to cane has been greatly overestimated, and without wishing growers to adopt a laissez-faire kind of attitude towards this pest, this statement is made purely in an attempt to allay a feeling of "seare" which might tend to develop amongst growers who encounter this pest for the first time.

On my previous visit to Finch Hatton towards the end of June, the adult flies were seen flying about and pupæ were to be found in the soil, but larvæ at that time were almost totally absent and no damage was being done. At the end of September only the larval stage was present, and these larvæ were doing slight damage to some cane planted in sandy soil on a few farms at the Gorge, Finch Hatton, the sets that had been planted a few months previously being attacked.

The maggots or larvæ were intermingled with the roots chiefly, and seemed to have the effect of destroying portion of the root system and weakening the plant, ultimately causing its failure to strike. Looking back over weather conditions there, we find that a considerable dry period existed previous to the September rains, and the plants attacked were those which had been planted up in July and August, and had been lying in a dry soil from six weeks to two months. Given a fair moisture content in the soil during this period the plants would have come away well before the maggots had a chance to do any serious damage, and an infestation of twenty to twenty-five maggots per set, such as was usually found to be a maximum, would have had little detrimental effect.

The same kind of maggots were found at the roots of blady grass, *paspalum*, couch, and two other local grasses unidentified. Although they were mainly found amongst roots, on a few occasions they were seen with their head portions embedded in the hard rind of the cane-set, and also in the rhizomes of blady grass. That it is a native grass pest which has turned its attention to cane was clearly instanced in one case in particular. A certain block of cane that had a patch infested with maggots was new land and had been growing lantana with a small clump of blady grass for a number of years. When this area was reclaimed and planted up with cane, it was seen that the patch of cane that was infested with maggots completely coincided with the area where the original blady grass intruded into the lantana.

In no case did I find ratoons badly infested with the maggots of this fly, and often these were quite free from pests, whereas in the previous year this cane had suffered infestation in the plant crop. Ratoons sometimes failed to come away owing to the effects of dry weather, or through cutting some varieties of cane too early in the season, or through other causes either individually or collectively. In many cases this state of affairs was invariably blamed to the activities of these maggots, but on digging the stools so affected I found no maggots nor evidence to support this view, and I was forced to attribute their failure to ratoon to some of the causes

enumerated above. Moreover, despite our frequent warnings not to plant bored sets, many of those that had been planted on some of the farms under consideration were found to have been completely destroyed through the activities of the weevil borer (*Rhabdoenemis obscurus*), and this damage was also credited to the Stratiomyid fly larvæ, which further led me to the above conclusion concerning its exaggerated position.

Control.

Up to the present no properly conducted control measures have been instituted against this pest, although numerous suggestions, such as the use of paradichlor., carbon bisulphide, and dehydrated tar and sawdust, have been made to the growers; and the fact that so few of these have thus far been tried is probably indicative that the pest has not assumed serious proportions.

Rotation of crops has been attempted, and potatoes were put in on one farm that was previously infested, but the block has not since been planted with cane, and, although on my last inspection the number of larvæ found were very small, it is premature to say that this procedure has been instrumental in checking their increase in that particular spot. However, other natural methods of control should be carried out, such as clearing all land under cultivation of grasses and keeping it clean; also the periodical firing of blady grass at the times when each brood of flies is emerging. These flies are slow of flight and sluggish, especially the egg-laden females, and numbers of these would fall victims to a good, brisk fire.

Some growers have been liming their sets, and claim to have had success with this method, but, unfortunately, no control plots were left by them, so no definite data concerning the results can be obtained. An experimental plot was laid out with the object of testing out this practice, and results will be watched with interest. However, weather conditions at the time were such that it is doubtful whether any definite conclusions will be drawn from this course.

Other Pests.

Weevil borers were still bad on some farms around the Gorge, and in parts of the Farleigh district. Cane at the Plane Creek mill coming from Carmilla was seen to be lightly infested, but as this cane has fortunately been mostly burnt this season, the danger of the weevil spreading to the Plane Creek areas is minimised. Wire worms (*Elateridæ*) had done some damage to young plant cane in the "glue pot" soils of the Racecourse area, and to a lesser extent around Mielere. At this last-mentioned place I discovered mole crickets (*Gryllotaplinæ*) attacking the young shoots on germinating sets.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has made available the following report from Mr. N. L. Kelly, Assistant to Pathologist:—

Innisfail and Babinda.

Leaf Scald is practically epidemic in these districts. The average percentage of infection in those farms visited in the two districts is probably in the vicinity of 3 per cent., which is dangerously high and means considerable monetary loss. Fields where the infection exceeds 10 per cent. were found at Miskine Siding and South Johnstone (S.J.), Mourilyan, and Liverpool Creek (M.) and Mundoo (G.), and at Frenchman's Creek, Deeral, East Russell, Barclay's Road (B.). The losses caused, coupled with the infectious nature of the disease, should ensure us of the co-operation of every grower in the district in its eradication.

7 R 428, H.Q. 426, N.G. 24, and to a lesser extent N.G. 15 infected stools have now largely reached the acute stage, wherein the sticks quickly wilt and later die from the top downwards. This wilting stage differs in appearance from a "grubby" stool, in that with Leaf Scald (1) some of the sticks are often apparently unaffected; (2) the wilting is not necessarily nor usually from the tips and margins of the leaves towards the mid-rib, but usually from one or more grey-blue streaks which are occasionally dotted with dull red; (3) in the case of one or more of the suckers at the base of the stool a fine white line can often be found running right down from the leaf margin to the base of the leaf sheath. This is the definite or critical symptom, though it is difficult to find just now in 7 R 428 and H.Q. 426.

Leaf Scald differs from Top Rot and the sclerotial diseases of the leaf sheath now very prevalent, in that with the latter there is a narrowing and choking of the cane tip, the death and offensive rotting of the heart leaves, the outside ones often remaining green; the shooting of only the topmost eyes, and the absence of the pencil line.

N.G. 15 is still largely in the chronic stage, wherein the fine white pencil line can be found on the upper leaves. This merges into a more injured state wherein the heart is badly infected, the inner leaves show considerable bleaching (or chlorosis) and distortion, and the pencil line can only be distinguished, if, as often happens, it has turned red. The side shoots are well developed and show the pencil line or much chlorosis. Stems in this state slowly die back from the top.

Control.

In view of the rapid spread of the disease in recent years it is obvious that no seed cut from a diseased farm can be guaranteed clean, however lightly infected the farm may appear. This being so, I looked carefully for a farm which could be declared clean, but in vain.

Similarly, at Babinda, several farms, now lightly infected, are being concentrated on, with the assistance of the cane inspectors, so that these may be used with confidence as distributing centres of cane for planting purposes. Meanwhile the following measures are recommended:—

1. If the field is apparently less than 5 per cent. infected, dig out diseased stools, preferably when the cane is young, in plant and first ratoon cane. Two or three inspections should be made before the cane is six months of age.

2. If possible, plough out after harvesting all fields more heavily infected.

3. Select seed with the utmost care, avoiding even those stools adjacent to infected ones.

4. Sterilise knives by immersing them for thirty seconds in boiling water before cutting a clean or a lightly-infected field, as the germs of the disease—bacteria—have actually been transmitted from infected to clean cane by knives.

5. Discard, for the present, the more susceptible varieties, H.Q. 426 and 7 R 428.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS.

When to expect Appearance of Cane-beetles.

Greyback cockchafer will probably emerge from the soil towards the middle or end of this month, the date of such appearance being dependent, of course, on the amount of rain received about that time.

Farmers chancing to notice large numbers of these beetles on feeding-trees growing close to headlands would do well to collect and destroy them. Such control work would prove profitable during a period of about six weeks following the date of emergence. The position near fences of favourite food-plants of this insect—notably, the native figs (the weeping or broad-leaved varieties), and the so-called Moreton Bay Ash tree (*Eucalyptus tessularis*)—should be located a few weeks beforehand; since these, if visited at intervals of two to three days subsequent to first appearance of the beetles, will serve to indicate the probable degree of grub-infestation for the coming season.

Fighting Leaf-eating Caterpillars.

During the middle of last month (October) a rather serious infestation of *Cirphis unipuncta* occurred among cane at Woree, the caterpillars of this moth being in such numbers as to demand the adoption of control measures.

The advance of these “army-worms” was successfully combated by spraying the cane leaves with arsenate of lead, in proportion of about six ounces of the poison to one kerosene tin full of water. The solution, however, could have been made much weaker, as 2 lb. lead arsenate to 50 gallons of water has proved an effective spray for such leaf-eating caterpillars.

When applying same, it is always advisable to treat a strip about 10 ft. wide of the untouched cane into which the army-worms are advancing, in addition to that upon which they may be feeding.

Occurrence of Cane Butterfly.

Damage to cane caused by larvæ of this butterfly (*Melanitis leda*) resembles that characteristic of army-worm attack. Caterpillars of the former insect, however, can be at once distinguished from those of other lepidopterous species affecting cane, owing to its having two long blackish horns arising vertically from each side of the head, and by its tail extremity being prolonged horizontally into two fleshy points.

The fully-grown caterpillar is about $1\frac{1}{4}$ in. long, with body tapering gradually towards each end. An interesting infestation of this cane butterfly was noticed by the Assistant Entomologist (Mr. A. N. Burns) last month at Sawmill Pocket, where the caterpillars were present in great numbers, and causing conspicuous damage to the young cane plants. We should be glad to receive notice from any growers who may chance to observe these caterpillars in their canefields.

Importance of Co-operation between Entomologist and Canegrower.

Farmers are again reminded that assistance of an entomological nature afforded them by the Sugar Bureau could be taken more advantage of, not only as regards the liberation amongst their borer-infested cane of Tachinid parasites, but also in respect of identification of the various insects, useful or otherwise, associated with cane, which they may happen to encounter from time to time. Any insect specimens forwarded to us (addressed Entomologist, Meringa, Private Bag, Cairns) will receive prompt attention.

FIELD REPORTS.

The Central Field Assistant, Mr. E. H. Osborne reports (23rd October, 1926):—

Sarina.

Next year's prospects were much improved by recent rains. Most of the early plant was backward, many fields showing an undue proportion of misses, helped probably by the heavy soil covering that was thought necessary in such a season. Planting operations were general. D. 1135, M. 1900, Q. 813, H.Q. 426, Malagache, Innis, and E.K. 28 are all grown hereabouts, the three former being most in evidence. D. 1135 has given good results in this area, and the writer noticed a small plant paddock cutting 35 tons per acre, with its last two tests being 16.1 and 15.7. Moreover, this was growing on a good alluvial flat.

Frost was responsible for a certain amount of damage in the Sarina area. M. 1900 seems to have suffered most. Good work was being done by the mill, and the power alcohol works were also nearing completion, assuring further prosperity for this very go-ahead sugar centre.

Disease and Pests.—Red Rot was seen in several paddocks at West Plane Creek, principally in M. 1900, and to a smaller extent in Black Innis. Growers are again earnestly advised to use only the very best of seed, and after ploughing out a badly-infested block use a lime dressing and if possible a green manure crop.

Knife Cut was noticed in D. 1135 and M. 1900, and also in White Bamboo.

Grubs were also responsible for much damage in the Plane Creek areas this year, notably West Plane Creek. Several growers mentioned that Greyback beetles had been very plentiful about the end of last year. Fumigation had not been tried upon any of the farms, and it is a great pity that where the annual loss is so heavy such precautions are not taken.

Lime (burnt) was used upon very heavy low-lying soil by a grower, with very good results, giving better soil texture and higher c.e.s.

Finch Hatton.

Owing to heavy rain only a very brief visit was paid, but growers were getting in as much work as possible in cultivating operations. The mill was doing exceptionally good work at the time.

Proserpine (including Bloomsbury and Banana Pocket).

Proserpine was visited about the third week in September and had been marvelously freshened by recent rains, tractors and horse teams being fully occupied.

The mill was in full swing and having put through about 5,000 tons of burnt cane from Banana Pocket and a considerable quantity of badly frosted cane, was doing more satisfactory work, helped greatly by the new pan recently installed. About 86,000 tons of cane are expected to be harvested, and the season will probably last until nearly Christmas.

The town itself is still developing, and a complete telephone system has been installed to connect with many outside areas.

Cultivation.—Nearly every grower was making the most of the favourable weather conditions. Several large blocks of Italian-owned cane showed that no pains had been spared to keep same clean, plenty of hoe work being very evident.

Q. 813 was being planted in most cases as most suitable for such late planting. One Waterson grower was trying an experiment of using molasses as a fertiliser upon second ratoons, at about the rate of 2,000 gallons per acre, with untreated check rows near by. This same grower is also draining a very low portion of his farm by using 25 chains of 4-inch tile pipes. His experiments will be decidedly interesting in both cases.

Varieties.—Q. 813, M. 1900, D. 1135, H.Q. 426, N.G. 15, Goru, E.K. 28, Malagache, Q. 116, &c., are the principal varieties cropped, with the two first easily most in favour. E.K. 28 is also receiving a good deal of attention. It might here be mentioned that so far Mackay experience of this variety indicates that it is most suitable to poor and medium soils.

Pests.—Borers were doing a good deal of damage in N.G. 15 (Badila) in one or two parts of the area and inquiries were made as to Tachinid flies being liberated.

Wire worms (so-called) are easily one of the major pests in this area and are the direct cause of much loss to early planted cane. Grubs in the Kelsey Creek area were helped along by such dry conditions, and accounted for a good deal of damaged cane.

Disease.—Owing to unusually dry conditions it was extremely hard to definitely locate any disease, but Red Rot was noticed in Malagache on a couple of farms in Cannon Valley and in M. 1900 and H.Q. 426 elsewhere.

Bloomsbury.

This centre has progressed rapidly within the past couple of years, and is now a settled cane area, with its rich alluvial flats capable of growing heavy crops of cane. N.G. 15, M. 1900, H.Q. 426, and Q. 813 are the principal canes grown, and give good results upon the rich or medium soils respectively. Some very fine crops of young cane (plant) were seen, and also some extremely good young ratoons. Unfortunately, this year's crop was rather below expectations, due to the dry season, and also very heavy frosty conditions, said to be quite an exception hereabouts.

Insect pests and diseases were conspicuous by their absence, too.

Banana Pocket.

This fertile centre has progressed wonderfully during the past four years, being now a very compact cane area. Quite lately a new school has been opened by the Education Department, and attached to the Post Office is a very handy telephone system. A nice large Recreation Hall has been opened and a number of large and comfortable dwelling-houses were seen upon several of the farms. Motor cars and trucks were much in evidence, and in general the "Pocket" presented a very prosperous appearance.

A.I.F. Men's Success.

Most of the growers are ex-A.I.F. Diggers, and it is good to know that, given normal seasons and a living price for cane, they are bound to make good.

Although dry weather, frost, and heavy cane fires had been experienced, the crops in general looked far superior to any seen elsewhere in the Proserpine cane district. Some fine plant N.G. 15, M. 1900, and Q. 813 were noticed, as well as some remarkably good first, second, and third ratoons. N.G. 15 is naturally on such suitable soil the main cane grown and yields very heavy crops. Q. 813 also does very well upon the mixed forest and scrub soil, the ratoons in particular giving very good density returns. M. 1900 upon the heavy black soil is very promising.

As far as disease or pests are concerned, the only one noticed was some army worms attacking Badila ratoons.

Banana Pocket growers are advised to try and keep their cane as clean as it now appears, by using none but the very best seed taken from their most vigorous cane in their own area.

Bowen.

Owing to the recent rains this area looked greener than it had appeared for a very long time. Unfortunately, it had suffered so severely that many growers are speaking of again going back to tomato growing. So far, practically no planting has been done for next year.

Mr. J. C. Murray, Southern Field Assistant, reports (14th October, 1926:—

Booyal.

Cutting and carting is in full swing. The growers here have no tramlines, consequently the handling has to be done by horse teams and motor lorries.

Farmers have established a variety plot at the school, under the supervision of Mr. Bates, the teacher. This is a step in the right direction, and is a matter that could be profitably taken up by other districts.

Mosaic disease is showing with a certain degree of frequency. As the writer was several times asked what was the origin and effect of this disease, the following description may be of use:—

Mosaic disease is a very old one in Queensland, having been noticed for over twenty years. Previous to 1919 it was known as "Yellow Stripe." This must not be confused with "Leaf Stripe" or Downy Mildew, this latter disease being due to fungus. B. 208 is a variety that consistently had to be discarded owing to its susceptibility. Later the general term "Mosaic" was applied to this malady. Mosaic was found in Hawaii in 1908, and has also been located in the Argentine, Porto Rico, Louisiana, Florida, Cuba, Jamaica, Trinidad, and Barbados. The disease in question is of the same general nature as the Mosaic disease of corn, and it is probable that it has been attacking this plant a considerable time also.

In dealing with Mosaic disease, plant selection is all important. Assume, for instance, a farmer requires plants from a certain block of cane. Let him get a sharp cane knife and enter the cane at the edge row. On looking along the cane, if there are Mosaic stools, the first thing that will attract his attention is the pallor of the effected stools. A closer examination will disclose that this paleness is caused by the disease gradually destroying the normal green colour of the leaf. This is usually evidenced by short, pale, irregular streaks or blotches on the leaf. On black, purple, or red canes, short, pale streaks are usually to be found on the rind of the cane itself, accompanied by shrinking and sometimes cankering of the tissues. With the cane knife, as he walks along the rows, the farmer can mark the effected stools by cutting the tops off one or two sticks. This is just a very brief description of the malady and method of plant selection, but it is hoped that it will be of some practical benefit to the farmers. Descriptions have often been published of diseases, but, usually, the only ones that the growers can digest are those that are brief and non-technical, the application of which can be converted into terms of pounds, shillings, and pence.

BUNDABERG DISTRICT.

Springfield.

The young plant and ratoon cane here has made a very good start, and if good weather comes shortly will give a fair yield next year. Conditions are as yet unsuitable for fertilisation. Cane varieties doing well are Q. 970 and Q. 813. Farmers are recommended to grow much more of the latter cane than they are doing. H.Q. 285 should be obtained and tried. Growers should bear in mind that Q. 813 is a shy ratooning cane if cut too early in the season. Gumming disease has a considerable hold in this locality, mostly in the M. 1900 Seedling, and the farmers should prepare to give this cane a spell, and this season, when the stools have been ploughed out, a good long fallow should ensue to allow the thorough rotting of the affected trash and root debris. It is impressed on farmers that it will be very unwise to neglect these recommendations.

Growers are doing excellent field work. Fields are well looked after, and there is no particular weed growth. The texture of the soil indicates that light dressings of lime each planting time would be beneficial. The writer believes that pulverised limestone, applied at the rate of about half a ton per acre every three or four years, would be of material benefit.

Farmers are apt to be misled by old sayings that lime exhausts the soil, overlooking the chemical point of view, and its value as a direct plant food; also its very valuable mechanical action on almost all crops. It is probable that in the past dressings of lime have been too liberal, practices not in accordance with the chemists' point of view.

Woongarra.

The autumn plant in this locality is green but growing very slowly, likewise the spring plant. Ratoons and standover look fairly well. The cutting is in full swing. The cane going to the mill is short, but of good sugar content. Gum is very much in evidence in some blocks, particularly in the variety Badila. Other canes affected are D. 1135, H.Q. 426 (Clark's Seedling), Black Innis, and M. 1900 Seedling. Q. 813 and Uba are apparently free from this disease, and H.Q. 285 is showing a certain degree of resistance.

Badila and Clark's Seedling are so susceptible to gumming disease that the further planting of these varieties should be discontinued. The growers should bear in mind that gumming disease promises to be very severe in the Bundaberg district, and they should make every effort to eradicate it. The following hints may be useful:—

Do not take plants from stools containing dead sticks.

Treat with suspicion any stools whose leaves have snuff-coloured or butter-coloured streaks or dead leaves.

Examine carefully cane sets before placing in planter. Any with discoloured cut surfaces should be discarded.

During lunch hour thoroughly clean knives with boiling water; in fact, clean knives always after cutting gummed cane, and be most careful in this respect when cutting plants, especially when cutting in different blocks.

Never buy plants unless they can be viewed in the field.

Sharon.

The cane in this district looks greener than that usually observed. Cutting is in full swing, some of the cane showing very fair growth.

Varieties looking well here are H.Q. 77, H.Q. 285, Q. 813, Black Innis, and E.K. 28. Black Innis and H.Q. 77 are not quite as good varieties as others mentioned. H. 227 is also being grown and making a fair showing. On the river the growers are having difficulty with Mosaic. It is to be feared that their losses are due to lack of early appreciation of the seriousness of this disease. However, Mosaic can be controlled easily enough, even in badly affected areas, if proper plant selection is made.

Mr. A. P. Gibson, the Northern Field Assistant, reports (5th October, 1926):—

CAIRNS DISTRICT.

Weather.

Showery, sunny, windy, and moderately cool nights have characterised the month. The district has been highly favoured, an unusual rainfall of 483 points had been recorded up to the 27th, thus increasing the year's total to 51 in.

Soils.

The sugar land is well balanced—that is, the alluvial deposits and volcanic red soils are proportioned well; this is of great benefit. The former mentioned is mainly found along the flooded lands of the rivers Barron and Mulgrave. Generally, they are higher in organic matter than are the red soils, and in parts are very fertile.

Canegrowing is mainly responsible for the upward progress of the district; it is favoured by having a fine port, with room for future extension. Many great Australian freighters are attracted to it weekly during the grinding season and depart heavily laden with the sugar won from the wonderfully rich soils. Many planters and business people have not fully recovered from the shock of last season occasioned by surplus sugar; this may happen again, therefore it is of paramount importance to encourage new industries which would stabilise the North and attract population to these parts.

The Crop.

Sugar-cane is truly a hardy plant and one possessing wonderful survival powers. Four weeks back the cane areas, especially on the higher and drier lands, were parched; timely rains came along and have caused quite a transformation. In spite of the low rainfall during the early growing period, the district has produced a big and sweet crop. It is expected that something like 548,000 tons of cane will be crushed by the three big mills, and that would be 17,000 tons better than last year. The mill work is good, and the average quality has never been better. Climatic conditions for the greater part have been marvellously suitable for the almost continuous working in field and mill, therefore good progress has been made. It is obvious that the season's output of sugar will easily over-shadow the 72,000 tons manufactured in the year 1925. The cane in general had stood well, and in consequence was weighing surprisingly well. Semi-dry conditions had rather favoured the planter on the moister lands; here the growth and leaf coloration was not affected, and the usual forced growth had been prevented which was an advantage. No damage had been occasioned by high winds or vermin, therefore such lands were raising high-quality crops and cutting well above early estimate, and to a great extent making up for the deficiency encountered on the drier areas.

Climatic conditions have been less favourable for harvesting this month. The almost daily intermittent showers had made the fields and headlands boggy, retarding the work of removing the loaded cane trucks from field to permanent way. This, in its turn, interfered with the factories' supply. The mills are working wonderfully well and reducing the district crop to the tune of over 20,000 tons weekly; even so, they must continue to work their hardest right to the year-end in order to finish. Mulgrave mill is treating its record crop, over 100,000 tons of which had passed between the rollers to the 25th instant; another 85,000 tons are expected. One week 1,050 tons of sugar were made. The rain generally had slightly lowered the quality of the crop.

Cultivation.

Great activity prevails on the farms. Weeds and cane alike are growing apace. This is a time when the interspaces are exposed and when weed growth would soon overmaster the new crop if not controlled. Most farmers realise the importance of this. The use of the expensive hoe and animal-drawn implements are being side-tracked as much as possible, preference being given to the more speedy tractor-drawn ones. The long stretches of dry weather had permitted more thorough preparation of the soil prior to planting.

Ratooning.

This operation should be performed immediately after trash is burned; many methods are adopted; the use of rotary cultivator is becoming popular for this work on the more friable ground free from obstruction.

Planting.

It is false economy to plant inferior seed; three months back attention was called to the planting of poor seed, the resulting crop was disappointing, and the lengthy empty spaces were replanted at a high cost. Planters had put over-much soil covering on plants because of the dry time, and in consequence the autumn strike was somewhat erratic. The spring plant at first germinated shyly; since the rain it has made remarkable progress. The bulk of the cane grown is Badila. More thought should be devoted to when this variety should be planted. A crop late planted on the virgin alluvial deposits and cut at twelve months may possibly yield a more profitable one than if harvested at fourteen months, whereas one planted late on the slower growing red soils may not be sufficiently advanced to harvest, and if cut would be so late that there would be a probability of it missing the ensuing year. It is generally considered that Badila as a plant is at its best at fourteen months, whereas Badila ratoons are at their best at twelve months. At present H.Q. 426 and D. 1135 are being planted; the soil is in fair order, but the work is made rather difficult owing to showery conditions.

Varieties.

It may be said that fully three-quarters of the crop grown are Badila, some areas are too poor to grow this kind profitably; instead H.Q. 426, D. 1135, B. 147, and a little Pompey are grown.

Manuring.

When we consider the great crop of sugar-cane raised annually and the large amount of plant food required in its making, it seems but common sense to return at least a portion of what is removed. Agricultural chemists know what plant foods are required by the cane, soil analyses should tell us if such ingredients are present and if balanced and in an available condition. Various mixtures at different rates per acre are added, the favoured ones are as follows:—

Basic super.—Deposited in drills when planting;

B3 and Howe's mixture.—Used when planting or deferred until the stool is well established, and to ratoons.

Sulphate of Ammonia and Nitrate of Soda.—As top dressings.

Lime is not largely used; organic matter is not being restored to the soil to anything like the extent that it should be.

Diseases.

Leaf Scald was observed throughout the area. Peg Leg: H.Q. 426 stools troubled with this did not ratoon. Leaf Stripe located in a paddock of Pompey has just been cut; the complaint may not appear until the year end. Mosaic: One stool of Shahjahanpur No. 10 contained this disease and was eradicated.

Pests.

Cane grub, weevil borers, and rats have caused very much less damage to the crop this year. Larvæ of the big moth borer, the tineid, the bud, and mid-rib borer were found abundantly. The tineid were widespread and were damaging ratoons. Their presence may be detected by the dead hearts of shoots.

Termites (White Ants).—It was interesting and new to find what appeared to be one of the ordinary wood-eating ants completely eating out cane stems high above the ground level at Aloomba. Cane sets were found destroyed by them in several fields at Freshwater. Yellow leaf ratoon patches similar to those noted at Innisfail were appearing here.

The mottled white patches at present showing on leaves is not a disease, such a condition is brought about by climatic conditions. Ants burrowing down to newly planted cane sets are possibly after insects surrounding the set.

Birds.

Many noisy Friar birds or Leather heads were observed licking the sugary substance exuding from the standing cane after burning. It is to be hoped this will not teach them to peck the standing cane.

Little Mulgrave Area.

This valley of brightness and wealth was again inspected. Big but rather low quality crops were being harvested. More standing scrub had been felled and new areas planted. The error of too close planting was noted, one good plant in a hole, with 3-foot spaces and 5 feet drills, should give satisfaction on such virgin fertile lands. It is expected the river valley portion of the cross-over road to Atherton will be finished by Christmas; this is, perhaps, one of the most interesting and scenic motor trips in Australia.

1927 Crop Prospects.

The unusually long dry spell had improved the soil conditions, and in conjunction with the splendid early rains had greatly benefited the new crop. Fields harvested this year had been ploughed out and replanted, therefore there will be a large area to cut from next year. The foregoing does not seem a wise procedure on the present face of things. It is, however, yet too early to state with any degree of certainty what the new crop will be, other than at present it is looking remarkably well and the making of a big crop.

RURAL CREDITS.

The Minister for Agriculture (Hon. W. Forgan Smith) has informed the Press that he had perused Mr. Earle Page's reply to Mr. Green's question in the House of Representatives on the matter of the Rural Credits Department of the Commonwealth Bank, as reported in the daily Press of recent date. "Dr. Earle Page," said Mr. Smith, "seems to assume that my remarks concerning the defects in the Rural Credits Act arose from an application to the Commonwealth Bank from the Queensland Peanut Pool. This is not the case, and my comment referred to the deficiency in the Act in question as applied generally to the financing of marketing Boards, and relates to all forms of agricultural produce."

"The Federal Treasurer quotes commodities that have been financed by the Rural Credits Department, but so far as I am aware few of the commodities mentioned have received any financial assistance in Queensland from the Rural Credits Department. Evidently, it is the intention to insist upon the pernicious practice of a State guarantee on the money advanced."

"It is obvious that producers must be able to obtain upon the security of their produce sufficient to cover the cost of harvesting and handling as soon as practicable after the crop is garnered and delivered to the Pool. I claim that this amount should be made available without insistence upon a Government guarantee. The Commonwealth Bank, as originally controlled, was prepared to advance on a State guarantee, and after the references that were made to the Rural Credits Department, particularly during the time of the election, it was to be expected that that Department would be constituted in a way that would be more helpful to primary producers."

"Personally, I am disappointed that in actual reality this is not the position, for in the ordinary conduct of trade difficulty would be experienced in giving legal possession of the commodity to a financial institution. This would apply particularly in the case of products that are exported, and where sales of the article are frequently arranged during the transit of the steamer overseas."

AN IMPORTANT QUEENSLAND INSECT PEST.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

During the month of October many inquiries were received by the Department of Agriculture and Stock regarding the destructive activities of a small insect generally referred to as a "fly" or "moth"; these inquiries, on investigation, were found to refer to a small bug belonging to the Lygaeidae. Nearly all the insects included in this family of bugs are small, but certain species sometimes occur in such enormous numbers as to justify their classification as important pests, and, in fact, one species—the chinch bug—is generally regarded as being among the ten most destructive insects of North America.

The bug responsible for the present serious losses in Queensland (*Nysius* sp.) is a very small insect that measures slightly more than an eighth of an inch in length when it has reached the mature winged stage (see Fig. 1); it is then of a dull greyish brown colour and possesses two

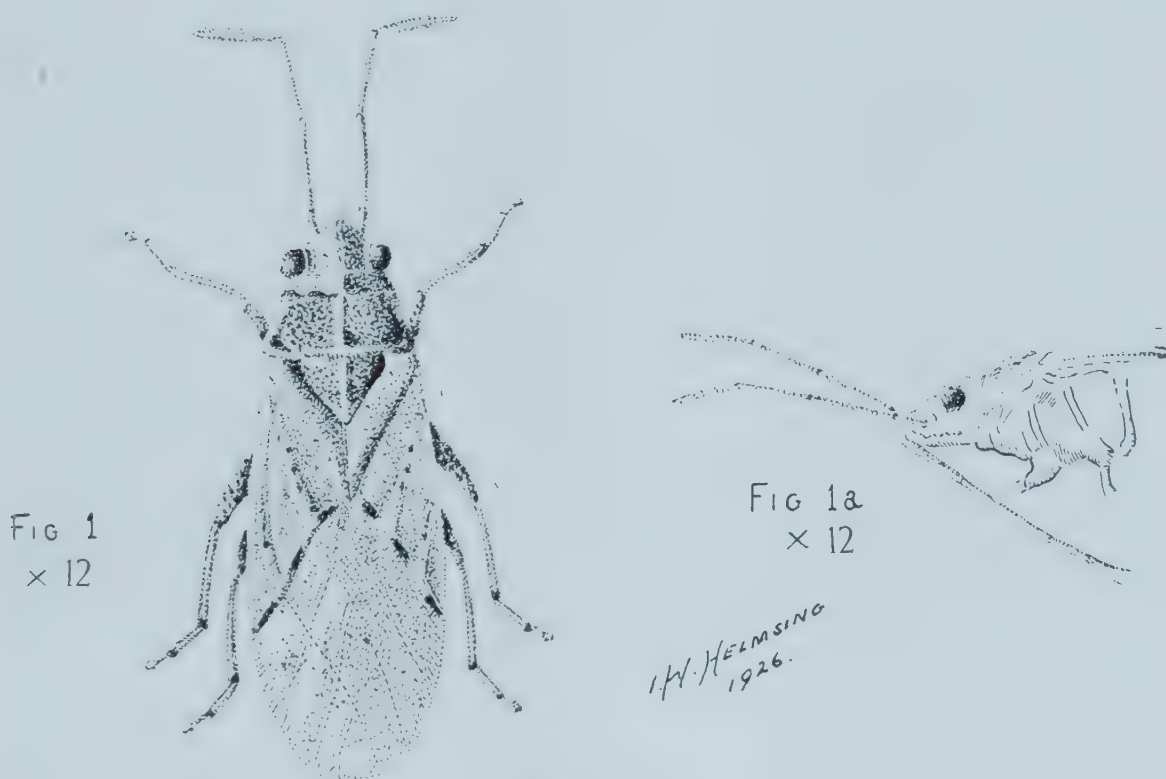


PLATE 83.

Fig. 1—*Nysius* sp.; mature insect. Fig. 1a—Side view of head, showing beak or rostrum on underside of body.

pairs of gauzy, silvery-grey wings that are folded flat on its back. During the daytime it moves about rather actively and readily takes to the wing when disturbed, but in the early morning and evening it is much less active.

A typical insect belonging to this group has three stages in its life cycle, the first being the egg stage; after the usual incubation period the eggs hatch into very small bugs that generally bear some slight resemblance to the mature insects into which they will later develop. These small bugs feed, grow, and moult several times and eventually produce the

mature winged stage; the mature insects then mate and lay eggs and so the life cycle is repeated.

The feeding habits of the bug are typical of the order to which it belongs in that it pierces the skin or epidermis of the leaf, stalk, or fruit on which it is feeding, and, through the puncture thus formed, it sucks the plant sap into its own body. The mouth parts are modified to form a beak or rostrum (see Fig. 1A) that performs this piercing and feeding function admirably.

The damage caused by each individual bug is trivial, but, unfortunately, at the present moment the bugs occur in enormous numbers in many fields and orchards, and the combined effect of their feeding is exercising a serious adverse influence on the plants attacked. When field crops are infested the leaves wilt and frequently die and the yield of the crop is thus seriously reduced; when the outbreak is in an orchard, many of the young attacked fruits fall to the ground, and of those that still remain on the trees many are blemished.

The bug has been found attacking many plants, among which mention may be made of the following:—Potato, tomato, peach, cherry, mango, grapes, and cotton. Its range of host plants is probably a very wide one.

With regard to control, it must be admitted that this pest is by no means an easy one to handle, and further field investigations are necessary before the position can be regarded as being at all satisfactory, nicotine sulphate, and kerosene emulsion have been used as sprays, but, for various reasons, these sprays cannot be regarded as offering a satisfactory solution of the problem of control. Spraying with such poisons as arsenicals should not be employed against this pest because it does not eat the foliage on which it is feeding, but merely punctures the skin or epidermis and sucks out the sap without eating the tissue that has been poisoned by the arsenical spray.

It seems probable that the most hopeful line of attack, if the area to be treated is not too extensive, is to use some mechanical means by which the bugs can be collected in large numbers. In New South Wales an endeavour has been made to do so by using sheets of galvanised iron the sides of which are turned up slightly to form shallow containers in which is placed a mixture of kerosene and water in the proportion of one pint of kerosene to one gallon of water. These containers are placed under the branches of the trees in the very early morning and the branches are then jarred sharply, when it will be found that numbers of torpid bugs fall into the kerosene and water and are rapidly killed. If sheets of iron are not available, or are regarded as too expensive, any large sheets of canvas or other material could be spread beneath the trees and when the bugs have been jarred on to these sheets they could be gathered up and the bugs shaken into a kerosene tin containing kerosene and water.

Where fields crops have to be treated it may be possible to exercise a certain measure of control by using a modification of this method by drawing shallow containers between the rows and beating the plants on either side to drive the bugs into these containers.

It will be realised from what has been said that there is as yet no easy and effective means of handling this serious pest, and it must be included in the category of those that require much further investigation. It is hoped, however, that if practicable under local conditions, some measure of relief may be obtained by the mechanical means just described.

TOMATO CULTURE.

By A. H. BENSON, Director of Fruit Culture.

Numerous inquiries are being received by the Department of Agriculture and Stock relative to the growing of tomatoes and to the diseases to which this fruit-vegetable is subject, and as no departmental pamphlet dealing particularly with this matter has been issued I purpose attempting to make good the omission and trust that the information contained in this publication, which has been collected from many sources, may prove of value not only to beginners but also to those who have been growing this crop for many years. During recent years few commercial crops have come into prominence more rapidly, become more sought after or universally used, than the tomato, as, despite the fact that it was introduced into Europe from South America at about the same time as the potato, it is only within the last half century that its use has become general—at any rate as far as Great Britain and her Dominions are concerned—and now it is in every-day use and in universal demand.

Like its near relative the potato, the cultivation of the tomato is practically world wide, and as far as Queensland is concerned it is in fruit throughout the year in one part of the State or another, and can be grown successfully from Stanthorpe in the south to the far north, and from the coast to extreme inland points where water is available. The tomato is thus always in season in this State and is fruiting freely in one part or another. In the Bowen, Townsville, and coast districts further north it is at its best during winter and early spring, and in coastal districts further south, where there is a total absence of frost, winter fruit is also grown, but the main crop is later than that of the more tropical North. The Brisbane district produces a heavy spring and early summer crop, and this is followed by a summer and autumn crop in the Stanthorpe district. In addition to these districts, tomatoes are grown generally throughout the State at the time of the year that is most suitable for their development. As tomatoes are always in season in this State, there is no occasion to specialise in the production of early fruit, and the use of hotbeds for raising early plants is not imperative; at the same time, as the tomato season in the Stanthorpe district could be considerably extended by this means, I will deal with this method of propagation later on.

Soils Suitable for Growing Tomatoes.

Although the tomato will grow in nearly any kind of soil, it does best when planted in a sheltered position well protected from cold and heavy wind and in a warm, deep, friable loam or sandy loam that does not become waterlogged during periods of heavy rainfall, or dry out rapidly or set hard during a dry spell. A friable soil that can be kept loose and which possesses the power to retain moisture during dry weather is especially suitable, as such a soil is conducive to the maintenance of an even growth of the plant—a very important consideration, as an intermittent growth renders it more susceptible to disease. Tomatoes should not be grown on land that has just produced a crop of potatoes or tomatoes, but should be grown in rotation with other crops, such as peas, beans, cabbages, maize, or any cucurbitaceous crop, otherwise the land is apt to become contaminated with the diseases attacking tomatoes and potatoes, as these diseases are carried over from one crop to the next. In addition to the danger of carrying over disease, continuous cropping with any one variety or class

of crop is bad farming, as much better results are always obtained by a judicious rotation of crops. The land should contain an adequate supply of all essential plant foods in a readily available form, but should not be too rich in available nitrogen, otherwise there is apt to be an excessive growth of foliage and a reduction in the yield of fruit.

Preparation of the Soil.

The preparation of the soil must be thorough. The land must be well and deeply worked and brought into a state of perfect tilth prior to setting out the plants. This is of the greatest importance, as heavy crops free from disease can only be grown where the plants can root deeply and freely, and are thus enabled to maintain a regular and healthy growth. Lack of care in preparing the soil will result in poor returns, especially if the planting is followed by dry weather conditions.

Raising the Plants.

Tomatoes are generally raised from seed in a specially prepared bed and the young plants transferred therefrom to their permanent position. Occasionally, however, the seed is sown where the plants are to remain, three or four seeds being set out in hills at convenient distances and the young plants thinned out when large enough. This method is not, however, commonly employed, nor is it recommended, except in the case of newly burnt-off scrub land where, if the weather conditions are favourable, good results can be obtained. A well-drained, sheltered spot, possessing a friable loam or sandy loam soil that will not set hard, should be selected for the seed bed, and if the soil is very dry it should receive a thorough soaking prior to its being prepared. The preparation of the seed bed must be thorough; the ground should be deeply worked, reduced to a state of perfect tilth, levelled, and a fine surface in which to sow the seed obtained. It can be marked off into beds of convenient size to facilitate watering and weeding, and it should be protected by means of a light framework covered with hessian or bushes, such as small-leaved tea-tree or others of a similar nature. The seed should be sown broadcast thinly over the surface of the bed and be lightly pressed into the soil and covered not more than half an inch deep. When planted, a light watering is all that is necessary, and the surface soil must be kept damp and not allowed to dry out till the young plants are well established; at the same time great care must be taken not to over-water, otherwise many of the plants will damp off or be destroyed by disease, and those that survive are apt to be weak and straggly. When large enough the young plants should be thinned out, as this will result in the production of strong, stocky plants instead of weak, spindly ones, and if there is any danger of disease they should be given a spraying with weak Bordeaux or Burgundy mixture. Weeds must be pulled out whenever they make their appearance, as the young plants must not be crowded out by weed growth. The beds should receive a thorough soaking the day previous to the lifting of the young plants, as this will enable the plants to be removed without any serious injury to their roots, and they will transplant better in consequence.

In the Stanthorpe district the use of a hotbed in which to raise the plants is well worth testing, as its use would enable growers to start planting out well developed plants as soon as there is no longer any danger from late frosts and thus tend to extend the fruiting period.

The simplest kind of hotbed consists of a heap of fresh horse manure from eighteen inches to two feet deep that is tramped down firmly and

covered with about four inches of fine sandy loam on the top, which is levelled and raked down fine. On this a wooden framework is placed, and this framework is covered with lights fitted with glass which can be raised or lowered as required, or with a screen covered with thick muslin, cheese cloth, or similar material that can be taken off or put on as required. Glass lights should not be essential, as a light covering should provide all the protection necessary against cold or sunburn. Where manure is scarce, the framework of the hotbed must be made much deeper and the manure placed within it, firmly tramped, and then covered with about four inches of fine soil. When the beds are prepared, the seed is sown as previously described. Care must be taken to see that the young plants do not become too tender, and they must be hardened off by removing the covered screens from the top of the frame prior to their being transplanted into their permanent position.

Planting.

The young plants, when removed from the seed bed, must have their roots kept moist and protected from wind or sun so as to prevent their drying out prior to planting, and when set in their permanent position they should be given a little water at the roots, and fine soil should then be placed round them, as this will tend, first, to give the young plants a good start, and, secondly, to retain the moisture round their roots, as the fine soil forms a mulch that prevents surface evaporation. The young plants should be set deeply in the soil, much deeper than they were in the seed bed, as by doing so a better and deeper root system is obtained, which is of very great importance in this State, where we are always liable to a spell of dry weather and where irrigation is in the majority of cases not practicable.

No hard and fast rule can be laid down for the distance apart at which to set the plants, as it depends on the variety, district, time of planting, and system under which the plant is to be grown.

When the plants are staked they can be planted in rows from 3 to 4 feet apart with the plants from 18 inches to 2 feet apart in the row. This gives room to cultivate the ground between the rows and to permit of gathering the crop. Another plan is to plant about 2 feet apart in the row with a good distance (6 to 8 feet) between the rows; but for the main crops, especially in dry districts where systematic cultivation to retain moisture is essential, planting 6 feet by 6 feet or 8 feet by 8 feet is recommended, the latter distance having proved satisfactory in the Stanthorpe and Bowen districts—as much as 10 feet by 10 feet being advocated by some Bowen growers.

Where the land has been well prepared and the soil moisture has been maintained by thorough cultivation, there is seldom any necessity for irrigation, as the tomato does not yield as heavily when over-watered as it does under drier conditions, as an excess of moisture tends to encourage excessive growth and to cause the blossoms to fall without setting fruit. Where irrigation is essential, owing to the dryness of the soil, the water channels should be made, first, close to the young plants and then further from them as the plants spread and cover the land, but care should be taken not to irrigate when the first blossoms are coming out or when the bulk of the crop is ripening.

The land must be cultivated after every watering in order to maintain a fine surface mulch, and it must be kept in equally good order when there is no irrigation as long as there is any space between the rows that can be worked.

Pruning the Tomato.

In order to obtain the best results tomato plants should be systematically pruned. The first pruning takes place in the seed bed, when, if the young plants are weak and spindly, it is advisable to pinch out the terminal bud when they are about 6 inches high. This has the effect of producing a stockier and more vigorous plant.

The main pruning is done when the plants are put out in their permanent positions, and it consists of pinching out the superfluous laterals that start from the axil of the leaves on the main stem or stems. Where the plants are staked they are usually pruned to a single stem and the fruit is produced on the opposite side of the stem to and midway between the leaves. The main stem is topped when it reaches the top of the stake to which it is tied and the whole energy of the plant is directed to the production of fruit, only sufficient leaves or foliage being allowed to remain on the plant to protect the fruit from sunburn. The same method is adopted when the plant is allowed to grow on the ground and several main stems are allowed to develop, as each main stem is treated in a similar manner to that employed in the case of a plant grown on a stake—that is, lateral growths are pinched out and the main stems stopped when they have made sufficient growth. By doing this excessive leaf growth is checked and the production of fruit is encouraged.

Manuring.

Although the tomato requires its plant food to be in a readily available form, thus indicating the desirability of applying quick-acting commercial fertilisers, the best results are obtained by combining the use of stable or farmyard manure with quick-acting fertilisers. The two sources of plant food should not, however, be applied at the same time, as stable or farmyard manure is found to produce too much vine growth at the expense of the yield of fruit if applied at or just prior to planting, and it is better therefore to apply it to the previous crop and to depend on quick-acting manures to be applied at the time of planting or even later. As the tomato is a comparatively short-lived crop and its actively growing period is limited, it must have its plant food available just when it requires it, and this is secured by following the instructions given above.

Several of the complete fertilisers now on the market contain all the essential plant foods required by the tomato in an available form, the percentage of nitrogen, phosphoric acid, and potash being about 4-8-10 respectively. A complete manure recommended by the Queensland Agricultural Chemist, Mr. Brünlich, is as follows, per acre:—1 to 1½ cwt. sulphate of ammonia or nitrate of soda, 4 to 5 cwt. superphosphate, 1 to 2 cwt. sulphate of potash. A top dressing of 1 cwt. to 1½ cwt. of nitrate of soda is sometimes very effective. It should be applied two to three weeks after the plants have been set out and when they have become well established. Care must be taken not to let the nitrate of soda touch the young plants or to apply it too near them; it should be spread broadcast on the ground between the rows and cultivated in. If any difficulty is experienced in distributing 1 cwt. to the acre evenly, mix the nitrate with three or four times its weight of dry sand and then apply.

Gathering and Marketing the Crop.

The exact stage of ripeness at which to gather the fruit depends on the market to which it has to be sent and the time occupied in the journey thereto. In no case, however, should the fruit be gathered until

it has fully developed, which does not mean that it is showing colour, but that the pulp surrounding the seeds fills the inside division or cells of the fruit and is becoming jelly-like. A slight tinge in the pulp is also visible, and in most varieties there is a slight fading of the dark-green colour of the skin at the apex of the fruit, which soon begins to assume a distinctly paler colour as well as browning at the point at which the fruit is attached to the stem. If gathered at an earlier stage the fruit will never develop its full flavour. Gathered at this stage it can be sent to distant markets without any difficulty, but where the market is close at hand it should be allowed to show at least a trace of colour before it is gathered. No hard and fast lines can be laid down, however, as different varieties require different treatment—a matter that can only be determined by careful observation. One thing, however, must be borne in mind, and that is, size has nothing to do with ripeness, and that palpably immature fruit will not ripen properly.

As the fruit, once it has become fully developed, matures rapidly it is necessary to go over the plants at frequent intervals, as if this is not done a quantity of fruit is apt to become over-ripe and unsuitable for any market other than one close at hand, or to be used for manufacturing purposes. The fruit should be handled carefully and all badly blemished or diseased fruit discarded. These should not, however, be left lying about on the ground to rot as is frequently done, but should be gathered and destroyed, as they are a ready means of spreading diseases.

The sound fruit is taken to the packing shed, where it is graded and packed in accordance with the regulations under the Fruit Cases Act and the cases marked with the grade of the fruit they contain. Tomatoes are usually packed in the half-bushel Australian case or the half-bushel long packer which has a central division. The former is the easier to pack, but the latter is preferred by many growers where the fruit has to be sent a long distance.

Varieties of Tomatoes.

Many varieties of tomatoes, varying greatly in size, shape, colour, and quality, are to be met with in this State, a number of which we would be better without. Whitish-yellow, pale coloured, or pale fleshed tomatoes are of little commercial value; irregular-shaped, ribbed fruit is not desirable, nor is outsized fruit. The ideal tomato is as nearly round as possible, from $2\frac{1}{2}$ to 3 inches in diameter, of a light-red colour, both skin and flesh, of firm texture, and, when cut in half transversely, it should show as little white pithy matter as possible and the cells should well filled with jelly-like pulp. The fruit should be free from blemish and the stem set in a small shallow cavity free from cracks or other imperfections. Such a fruit will carry well, is appreciated by the purchasing public, and is eminently suitable for canning or converting into sauce.

The question of improving our existing varieties of tomatoes by careful seed selection of approved types and the discarding of inferior types is well worth attention and it will pay growers to select ideal fruit from healthy, vigorous productive plants for seed.

The method of saving the seed is as follows:—The selected fruit should be allowed to become fully ripe on the plant, and when gathered it should be placed in a wooden tub and pounded into pulp. Fermentation will soon set in and the pulpy matter surrounding the seeds become decomposed and separate from the seed. Water is now added and the mass thoroughly well stirred. The good seed will sink to the bottom and

the pulp, &c., will rise to the top and can be skimmed off. The seed should then be well washed, placed on screens, and dried in the sun.

The following varieties are those most extensively grown in this State:—Burwood Prize, Stone, Chalk's Jewel, Crimson Cushion, and Livingston's Globe. In addition, the following wilt-resistant varieties have been tested and are worth further trial—viz., Columbia, Norduke, Norton, Marvel, Bowen Buckeye, and Denisonia.

Diseases of Tomatoes.

The tomato is subject to the attack of both insects and fungi, and serious losses are occasioned thereby. With respect to the former, the so-called tomato caterpillar *Chloridea obsoleta*, which is so destructive to maize and cotton, causes serious loss to our growers by eating into and spoiling the fruit. The only effectual remedy is to spray the plants and young fruit with arsenate of lead, using 4 to 5 lb. of the dry powder to 100 gallons of water. Several sprayings are necessary, and the first should be given as soon as the first fruit is formed, and this should be followed by further sprayings at intervals of about ten days till the fruits are full grown.

Where fungus diseases such as early or late (Irish) blight are likely to occur, Bordeaux or Burgundy mixture should be used in conjunction with the lead arsenate, as the combined spray or dust will act in the dual capacity of an insecticide and fungicide. Where dusting is used, the dust must be in the form of an impalpable powder, and it should be blown on to the plants by means of a dust gun, preferably a knapsack dusting machine, in the early morning when the dew is on the plants and there is little or no wind, as every part of the plant is then reached. Good results have been obtained recently where this has been carried out in an efficient manner.

Cutworms.

These extremely destructive insects, which remain hidden in the soil during the day and come out at dusk, frequently destroy large numbers of young tomato plants by cutting them off at the ground level. They also feed on the foliage of older plants and seriously injure them. These insects can be kept in control by the use of poisoned baits, the making and use of which is described by the Entomological Branch of this Department as follows:—

“Bran, 50 lb.; Paris green, 2 lb.; molasses, 2 quarts; 3 oranges; water, approximately 4 gallons. The Paris green and bran should be thoroughly mixed together dry; the juice of the oranges, the finely chopped fruit, and the molasses should then be added to some of the water. The latter mixture should now be combined with the Paris green and bran and should be thoroughly stirred, enough water being added to produce the right consistency. This must be determined by the user, but only sufficient water should be added to have the mixture in a crumbly condition and thus permit of being scattered broadcast on the ground; at the same time sufficient water must be added to ensure that each flake of bran has been moistened with the molasses to make it attractive and also to enable it to carry a small quantity of Paris green.”

Apply the bait in the evening so that it does not become dried up before the cutworms start feeding. If oranges are not procurable make the mash without them; they are only added as an attractant. If a smaller quantity than the above only is required, prepare the same proportions. Keep poultry away from the bait.

Nematodes.

These microscopic worms infest many of our soils and frequently cause serious injury to tomato plants. The worms form numerous swellings on the roots and the plants suffer in consequence. Nematodes are very difficult to control, as once a soil has become infested they are hard to get rid of, as they attack many different crops and many kinds of weeds. They can be materially reduced by growing a crop on the land that they will not attack, as, not having anything to feed on, they die out. On land infested with nematodes tomatoes should never follow tomatoes or potatoes, but a complete change of crop should be made.

FUNGUS DISEASE.

As regards fungus diseases, when weather conditions are favourable for their development—viz., muggy, misty, or steamy weather and a more or less saturated atmosphere—they cause serious loss and are very rapid in their effects.

Damping Off in the Seed Bed.

This is generally due to one or more species of soil-infesting fungi attacking the young plants at or a little below the surface of the ground and causing them to rot and shrivel up. The best preventive is to select new soil and not to use the same beds season after season. If it is found that the soil generally is fungus-infested, watering the seed bed prior to sowing the seed with a solution of sulphate of iron (1 lb. to the gallon of water) would probably have a good effect. Injudicious watering, bad drainage, too much shade, or insufficient ventilation where hotbeds are used, frequently cause the young plants to damp off.

Late or Irish Blight.

This is identical with the disease of the same name which attacks potatoes, and the remedy is of a precautionary nature as, once the disease has made its appearance, it cannot be cured. Systematic spraying or dusting with Bordeaux or Burgundy mixture before there is any sign of the disease is an efficient preventive, as the spores of the fungus that cause the disease cannot germinate if the leaves and fruit are protected by the fungicides named. Irish blight is always liable to make its appearance when the weather conditions, as previously described, are favourable, and it will pay growers to take the necessary precautions even though they may not always be needed, as one can never be certain of the weather, and it is always safe to err on the cautious side, as the grower who is able to market a crop of sound fruit when his neighbour's crop is a failure can depend on obtaining a good price for it.

Blossom End Rot.

This is a very common trouble and one that frequently destroys large quantities of fruit. It cannot be controlled by spraying, but the loss due to it can be lessened by taking the following precautions:—

- (1) Select seed from plants that show no sign of this disease.
- (2) Encourage the plants to root deeply by preparing the soil thoroughly prior to planting.
- (3) Maintain the supply of moisture in the soil by frequently stirring the soil.

- (4) Prune out laterals and stop terminal growths when four or five fruit clusters have formed so as to keep down an excessive but at the same time encourage an even plant growth. Uneven growth is one of the principal causes of this trouble.
- (5) Do not plant tomatoes on land where the previous crop has been affected.

Wilt.

This disease is caused by a soil fungus (*fusarium*) which enters the plant through its roots; and once the soil has become infected the disease spreads rapidly and all plants are liable to become affected. Tomatoes should not be planted on land in which the disease has previously made its appearance, but such land should be put under a totally different crop, and any weeds or plants of the same natural order as the tomato, such as the "blackberry" (*Solanum nigrum*), tobacco, Cape gooseberry, capsicum, petunia, devil's apple, thorn apple, &c., should be excluded. So far there is no known remedy other than the growing of resistant varieties, of which several have been introduced into this State—viz., Marvel, Norduke, Norton, and Columbia—and have shown that the resistant qualities they developed in the United States of America continue to a greater or lesser degree when they are grown in this State.

Variegated Foliage and Tomato Rosette.

Variegation of the foliage probably belongs to the Mosaic order of plant diseases, probably due to direct germ inoculation. The only remedy is to pull out and burn all affected plants. Tomato Rosette should be treated in a similar manner.

Remedies.

As the diseases of the tomato that cause the greatest loss are first the caterpillars that destroy the fruit and the various other insects that eat the fruit or foliage, there is one general remedy—viz., to poison the food on which the caterpillars or other insects are feeding, and the best poison to use is arsenate of lead, sprayed or dusted on the plants, and the gathering and destruction of all affected fruit.

With respect to fungus diseases, there is also one remedy—viz., spraying with Bordeaux or Burgundy mixtures or dusting the plants with these mixtures in the dry form in order to prevent the germination of the spores of these diseases. The 4-4-40 Bordeaux Mixture is made as follows:—

- (1) Dissolve 4 lb. of bluestone in 20 gallons of cold water in one cask by placing it in a bag and suspending it in the water.
- (2) Slack 4 lb. of unslacked lime in another cask slowly by first pouring about 3 pints of water over it. This will reduce the lime to a thick cream free from lumps. Water should now be added, stirring well till there are 20 gallons of milk of lime in the cask.
- (3) Stir the milk of lime up well, strain it and pour the whole of the 20 gallons of milk of lime and the 20 gallons of bluestone water together slowly into a third cask; stir well for three minutes, and if properly made the mixture is fit for use.

The mixture is much better if made in this manner than when a strong solution of bluestone and lime is first mixed together, and water to make up the required quantity is afterwards added.

In order to see if the mixture is properly made, plunge a bright blade of a knife into it for a minute. If the knife is untarnished, the mixture is all right; but if the knife is stained a coppery colour, then more milk of lime must be added. This is only a rough test; and where accuracy is necessary the mixture should be tested as follows:—To a small quantity of a solution of ferrocyanide of potassium in a test tube or small glass add a few drops of the mixture to be tested. If it turns brown, more lime is required to be added till the mixture fails to produce the brown colour. The solution of ferrocyanide of potassium is made by dissolving 4 oz. of this substance in one pint of water.

The mixture should always be neutral, as if there is an excess of bluestone it is apt to injure the foliage. Use water that is free from iron, and do not make the mixture in iron, zinc, or tin vessels of any kind—wood is the best.

If desirable, a stock solution of bluestone may be kept on hand for use as required. Such a solution may be made by dissolving 100 lb. of bluestone in 50 gallons of water. Place the 100 lb. of bluestone in a bag and suspend it in the cask of water, and in the course of a couple of days the whole of the bluestone will be dissolved, and each gallon of the solution will contain 2 lb. of bluestone.

To make the 40-gallon solution you therefore take 2 gallons of the stock solution of bluestone and add 18 gallons of water to it, to make up the 20 gallons of bluestone solution for mixing with the 20 gallons of milk of lime as previously described. A stock solution of milk of lime can also be made, but it is better to make it as required.

BURGUNDY MIXTURE.

As unslacked lime is not always procurable, Burgundy mixture can be used instead of Bordeaux mixture. It is made as follows:—

- (1) Dissolve 8 lb. of bluestone in a cask containing 35 gallons of clean water. This can be done by placing the bluestone in a small bag and suspending it in the water, or, if the mixture is wanted in a hurry, dissolve the bluestone in boiling water, reducing to 35 gallons with cold water.
- (2) Dissolve 10 lb. of washing soda in another vessel in 5 gallons of water.
- (3) When both the bluestone and the washing soda are dissolved, pour the washing soda solution slowly into the bluestone solution, stirring the mixture well whilst doing so, and it is then ready to use.

Be careful to always pour the washing soda solution into the bluestone solution; don't pour the bluestone solution into the washing soda solution.

Burgundy mixture should be used the same day it is made, as it loses quality by keeping. Both Bordeaux and Burgundy mixtures can be used in conjunction with arsenical sprays, when the combined materials form a dual-purpose spray that is efficacious as a fungicide, as in the case of Irish blight, and as an insecticide where the leaves of the tomatoes are also being eaten by caterpillars or other insects.

QUEENSLAND AT DUNEDIN.

NEW ZEALAND AND SOUTH SEAS EXHIBITION, NEW ZEALAND, 1925-26.

On his return from New Zealand, where he acted as Queensland's representative at the New Zealand and South Seas Exhibition at Dunedin, and was also officer in charge of the exhibit from this State, Mr. H. W. Mobsby, F.R.S.A., F.R.G.S., of the Department of Agriculture and Stock, presented a very complete report, from which the subjoined interesting abstract has been made:—

My first duty is to deliver a cordial official message from His Worship the Mayor of Dunedin, Mr. H. L. Tapley, M.P., who has asked me to convey greetings from himself and the citizens of Dunedin to the people of Queensland, and to congratulate the Government of Queensland on its display at the New Zealand and South Seas Exhibition.

The Exhibition was officially opened by His Excellency the Governor-General of New Zealand, Sir Charles Ferguson, on 17th November, 1925, in the presence of 45,786 people, and was officially closed on 1st May, 1926, by the Prime Minister, Hon. J. P. Coates.

During the currency of the Exhibition a total of 3,200,498 visitors was recorded, a daily average of 22,538; 1,778,400 paid at the gates, and the balance, 1,422,098, were season and other ticket holders; with an attendance of 83,952 on the closing day. In the course of the five months of the Exhibition 61,294 school children were brought from all over the Dominion free by the Government, and visited the Exhibition. They were cared for by the citizens of Dunedin in co-operation with the local school teachers, who willingly gave their time and attention to the children's comfort.

The children were escorted through the pavilions by their teachers in groups of from 100 to 300 each day, and were addressed by the officers in charge of the several displays. The teachers were supplied with descriptive literature, and the Queensland officer took the fullest advantage of this form of education as to the progress and possibilities of our State.

PUBLICITY.

Queensland on the Film.

Our cinema films of our cotton and banana industries were used in the Government cinema room during the whole course of the Exhibition, and proved to be a very valuable advertisement to Queensland.

On the Air.

Radio talks were given by me from V.L.D.N., the broadcasting station at the Exhibition, on Queensland, stressing the importance of purchasing goods of Australian production, especially Queensland pineapples and other products. Acknowledgments from "listeners in" in distant parts of the Dominion as to the interest and value of information broadcasted, and wishing Queensland every success, were received.

Literature.

The State of Queensland sent a large and attractive contribution in eight separate publications, containing a wealth of information for prospective tourists or settlers; and their careful distribution will result in Queensland becoming better known to New Zealanders and visitors from other parts of the Empire. The general broadcasting of such literature does little if any good; but all schools and institutions were supplied, and those who were interested needed only to apply and they were given booklets dealing with every part of Queensland and from every point of view.

First in the list of publications is the "Queensland Agricultural Journal," dealing with every side of life on the land in different parts of the State. It is an ordinary monthly issue of a magazine that is similar in many respects to the journal issued by the Government of New Zealand, but it is profusely illustrated, and contains features that are sure to interest all farmers and prospective visitors to the State. Other publications included the numerous pamphlets published by the Queensland Intelligence and Tourist Bureau.

The Press.

The daily newspapers of Dunedin, including the "Otago Daily Times" and "Evening Star," as well as the weekly paper "Otago Witness," were all untiring in their efforts to obtain Queensland news, and gave this State great publicity during the currency of the Exhibition. In fact, their demands for Queensland items were insatiable, and from this one may fairly judge that our State and its opportunities are highly regarded in the sister Dominion.

The amount of space devoted to Queensland's share in the Exhibition, to the unlimited field she offers to new settlers, and of trade opportunities, was amazing and most gratifying. Thus, through the agency of a distinctly friendly Press, a tremendous amount of public interest was aroused in Queensland's manufactures, primary products, and general resources. Much of the success of Queensland's effort at the Exhibition was undoubtedly due to the quantity of ably filled space allotted us by the local newspapers, which have reached a very high journalistic standard.



PLATE 84.—NEW ZEALAND AND SOUTH SEAS EXHIBITION, DUNEDIN, 1925-26.

Queensland Court, showing Central Avenue—Minerals, Forestry, Cotton, &c., on left; Agriculture, Wool, and Fibres, Tropical, &c., on right.

Queensland's Products a Revelation.

Another important point stressed by the local Press was the desirability of removing all tariff anomalies that exist between the two Dominions. Queensland's products, both raw and manufactured, were a revelation to New Zealanders. Our tropical products particularly interested them, and many inquiries were received from leading local business houses with the object of opening up a direct trade with this State. The Exhibition and Queensland's share in it did much to remove what might be described as a provincial or insular prejudice that possibly to some extent had existed. It also gave point to a generally manifested desire for closer trade relationship. In this connection not the least of the benefits derived was the generation of a general desire to remove all fiscal anomalies and artificial trade barriers between the Dominion and the Commonwealth.

To the Dominion Press our thanks are due for stressing the existence of these disabilities and urging their removal in our common interests.

The many real kindnesses and courtesies extended to me by the Dunedin Press were appreciated greatly. Every effort was made to satisfy their eagerness for real facts about Queensland.

Australia Day.

Australia's birthday celebration at the Exhibition drew a great crowd of visitors. The Australian Silver Band being engaged for the day, they rendered a fine programme of music in the rotunda in the Grand Court. During the afternoon and in the evening they played in the Australian Pavilion, attracting such a crowd that the Queensland section was absolutely packed. Appropriately the band was accommodated within the space occupied by the exhibit of the Newcastle Steel Works, and alongside the Queensland Court. Of the band of thirty members ten were New South Wales, eight Victorian, six Queensland, four South Australia, and two Western Australia—a truly Commonwealth combination.

Anzac Day.

Anzac Day was observed in the Festival Hall at the Exhibition on Sunday, 25th April, with ceremonies befitting the occasion and with appropriate tributes. All the Commissioners of the British, Canadian, Australian, Queensland, New Zealand, and Fijian Courts at the Exhibition, as well as all public bodies and societies, attended. On behalf of Queensland I placed a wreath on the Cenotaph. There was an attendance of over 3,000 people. The Rev. Dr. E. N. Merrington, C.F., late of Brisbane, led the service in prayer. The chairman, Mr. E. J. Anderson, president of the Returned Soldiers' Association, expressed strong appreciation of Queensland's tribute.

THE QUEENSLAND COURT.

On the opening day His Excellency the Governor-General, Sir Charles Ferguson, Lady Ferguson, and party visited the Queensland Court, and were much interested in the exhibits, especially the cotton and tropical products displays. At the official dinner on the following day His Excellency, in his speech, singled out the Queensland exhibit for special reference; and Hon. J. P. Coates, Prime Minister, said—

“The Queensland Court will be the means of bringing Queensland and its people in front of all the people of this country.”

In the course of the Exhibition all the Ministers of the New Zealand Government visited the Exhibition, and all were very eulogistic of Queensland for having sent such a comprehensive, instructive, and informative display. The Commonwealth Special Commissioner, Mr. Clive McPherson, in his report to the Prime Minister, said—

“The Queensland Government exhibit is deserving of special mention, and is of the greatest value to the Australian Court; it is under the supervision of Mr. H. W. Mobsby, who is lending valuable co-operation to Mr. Smallhorn in any matters of Australian interest.”

The Hon. Wm. Allen, Premier of Victoria, visited the Exhibition, and on his return to Victoria said—

“The whole Exhibition was wonderful, but Queensland had by far the best display.”

The Rev. Dr. Merrington, formerly of Brisbane, paid several visits to the Exhibition and to our court, and in an address he gave at its close said—

“Memory and information abided; the Exhibition did not come to an end, but lived in minds and memories.”

His Worship the Mayor of Dunedin, Mr. H. L. Tapley, M.L.A., was a frequent visitor to the Queensland Court, and at the several functions associated with the Exhibition was generously appreciative of our exhibit.

EXHIBITS.

The exhibits were displayed on a space 60 feet by 51 feet, on which were trophies of Agriculture—Wheats, Grains, Chaff, &c., Wool, Fibre, Cotton, Forestry, Mining, Canned Fruits, Tropical Agriculture, Native Grasses, Dairy Products, and Canned Meats, and Fleeces of Wool.

Our space being next to the Canadian Court on entering the Australian section, Queensland was the first sighted. So much so that the Australian Commissioner placed an arch on columns with “Commonwealth of Australia” thereon to be seen first, backed up by Queensland products.

Agriculture.

The wheats (twenty-two varieties, bred at Roma State Farm, including early maturing and rust resistant varieties), maize (ten varieties), oats, barley, and other grains on this trophy impressed deeply the farmers and millers of New Zealand

visiting the Exhibition. They expressed astonishment at the number and quality of the varieties produced by this State. The exhibits formed an object lesson inasmuch as the method of seed selection and grading, especially as applied to maize, was shown. Teachers and scholars were also very interested in what appeared to them to be the systematic and careful methods carried out by our State Government for the benefit of the man on the land. There is at present an embargo on the landing of wheats and grains in the Dominion, although to all appearances New Zealand, climatically, will never be a recognised wheat producing country, for seasonal conditions are generally not quite favourable.

Cotton.

The exhibit showed the improvement effected in the types of cotton now grown, the system of grading, thus illustrating the desirable and undesirable characteristics. Specimens of graded, combed cotton seed showed the comparative lengths of staple and the benefits of careful seed selection.

The by-products, including the crude and refined oils, the seed cake, and the stages of process dealing with the crushed seed as a food for milk and egg production, were also a part of this trophy.



PLATE 85.—NEW ZEALAND AND SOUTH SEAS EXHIBITION, DUNEDIN, 1925-26.
Queensland Court, showing Side Avenue—Cereals, Wheats, &c., Sugar-cane, and Wool.

The process of spinning from the raw material to the finished cloth was also shown; thus, as an educational display, it was a great favourite with the school teachers and children. Cotton cannot be produced in New Zealand, and if imported to the Dominion for spinning purposes there is at present a duty of 4d. per lb. on it.

Wool.

Our fleeces were shown in conjunction with our native grasses; a trophy of scoured and greasy wool also occupied a prominent position. The fleeces represented some of the high class merino wools from the western districts of our State, and, being Queensland's primary industry and one for which we have established a reputation in the world's markets, it created a deal of attention, and the quality was highly commended. The exhibit was awarded first order of merit, which award includes a medal.

Dairy Products.

Queensland's exhibit of dairy products, including butter, cheese, bacon, and hams, as well as canned meats, was only a small, though complete, representation of the dairying industry of Queensland, now so firmly established and steadily expanding. The information given regarding this section was eagerly sought by the schools and the man on the land, as well as by commercial men. The system of herd testing conducted by the Department of Agriculture and Stock, free of expense to the dairy farmer, and the figures associated with this branch for 1924-25, were appreciatively noted by both producers and distributors. The cheese exhibit also interested the visitors. After displaying for a time it was changed for other cheeses taken from the cold storage of the Tairie and Peninsular Dairy Company, and so shown alternately, the temperature of the building being suitable while it was on display. This company very courteously gave me every facility in the care of this product. At the test the manager declared that the Queensland cheese was the finest he had ever tasted of those imported into New Zealand. It was eagerly sought after by the proprietor of the largest up-to-date hotel in Dunedin, who bought it, and has since written commendatorily to the factories concerned, Pittsworth and Southbrook, about it.

Canned Pineapples.

This trophy was a source of great publicity to the opening up of the tariff question and to the slogan: "If you cannot buy Dominion goods, buy of the sister Dominion." In the matter of pineapples, it was found that the same product, grown by black labour, was imported to New Zealand from other countries under a British preferential tariff of 25 per cent., whilst the Australian product, grown by white labour, was burdened with an impost of 35 per cent. Our products were much sought after. I was able to obtain a shipment of the actual fruit to exhibit in conjunction with the cans. This was in great demand, and after a display of two weeks sold readily, the prices obtained ranging from 1s. to 3s. each, according to the size of the pineapple.

Tropical Products.

Queensland was in the unique position of being the only State that could display tropical products. Consequently, our tobacco, sugar, rice, and nuts (Pecan, Queensland, and peanut), cassava and its by-products, tapioca, and starch, in the stages of manufacture, and power alcohol, a product of cassava, all attracted the keenest attention and inquiries from those whom, commercially, they interested. For instance, the confectioners, who in their business use peanuts and walnuts, were much interested in the Pecan nut which is used largely in America.

The people of New Zealand are only too willing to trade with Australia in her products, especially as it applies to what they cannot produce themselves and which they have to import. Hence their slogan: "If you cannot buy Dominion products, buy of the sister Dominion, Australia," has some force.

AWARDS.

The following Agricultural Exhibits gained awards:—

Fifteen varieties Wheat	} First Order of Merit.
Six varieties Maize	..	..	..	..	..
Two varieties Popcorn	..	..	..	..	..
Eight varieties Rice	..	..	..	..	..
Five varieties Sorghum	..	..	..	..	..
Tapioca (stage of manufacture)	} Awaiting final information.
Linseed	..	..	..	..	..
Sisal Fibre	..	..	..	..	..
Sisal Fibre (ropes and cordage)	..	..	..	..	..
Wool	..	..	..	..	..
Cotton	} Awaiting final information.
Tobacco	..	..	..	..	..
Sugar	..	..	..	..	..
Canned Pineapples	..	..	..	..	..
Native Grasses	..	..	..	..	..
Canned Meats	} First Order of Merit.
Minerals	..	..	..	..	..
Forestry	..	..	..	..	..
Brimm and Son—Plywood	Second Order of Merit.

GENERAL.

Queensland and New Zealand Trade.

While I was in Wellington the possibility of making Brisbane a port of call during the Tourist or Fruit Season, so as to obviate the necessity of transshipping at Sydney, especially on the alternate round trip of Auckland, Sydney, Wellington, Bluff, and Melbourne, was suggested to those concerned.

Inter-Dominion Friendliness.

Early in the period of the Exhibition a rumour was rife that some unfriendly feeling existed between certain sections in Australia and New Zealand. When information on this point was sought the suggestion was vigorously rejected. The evident popularity of the Queensland Court, and of the Queensland Government which had seen that the industries and commerce were represented so effectively, gave a strong denial to the mischievous rumour. Quite the reverse was the case, and on all sides was expressed a desire to become better acquainted with Australia, Queensland particularly.

Queensland Regarded as the Most Progressive State.

Favourable comment was the order of every day towards the Queensland Government as controlling the destinies of the most progressive State in the Commonwealth Group. The presence of such a comprehensive range of exhibits—raw and manufactured products—that compared most favourably with the exhibits of other States and countries, was accepted as an example of Queensland's wide-awakeness, skill, primary wealth, prosperity, and good government.

Closer Trade Relationship.

The success and completeness of the Queensland Exhibit stimulated numerous trade inquiries and a strong desire for closer trade relationship.

New Zealand as a Market for Queensland Products.

On the other hand I submit that full consideration should be given by Queensland to the opportunities of improving her trade with New Zealand.

A very high opinion was formed of Queensland as a direct result of our very effective display; and complimentary remarks were made regarding a Government so alive to the interests of its people, both in primary and secondary industry, as to represent its industries and evidences of its substantial progress, so strongly at Dunedin.

The impressions of Queensland from the criterion of its successful and particularly representative industrial display were deep, and were expressed in the almost universal remark at the Exhibition, "Queensland is the coming State of the Commonwealth."

QUEENSLAND'S REPRESENTATIVE APPRECIATED.

The following appreciation of Mr. Mobsby is taken from the "Evening Star" (3rd June, 1926), Dunedin:—"To those who have been constantly in touch with affairs at the Exhibition from the opening to the close have been revealed some officials who, though not happening to wander overmuch into the spotlight's magic circle, have done invaluable work for the department or the country which they represent.

"One of these is Mr. H. W. Mobsby, F.R.G.S., specially appointed to look after the interests of Queensland at the Exhibition just closed, and in whose hands the striking exhibit of the 'Banana State' was made the feature of the Australian Court. Queensland, indeed, was the only Australian State that was adequately represented so far as a comprehensive exhibit is concerned, and Mr. Mobsby's good taste and experience made the most of the opportunity. He, on several occasions, broadcasted, in interesting fashion, information regarding the products of the State, and in divers ways kept it constantly before the New Zealand public.

"As we have indicated, Mr. Mobsby, while jealous of the reputation of his State, does not seek personal aggrandisement. He 'did his job,' and is satisfied with the result. It came as something of a surprise, therefore, when, in the course of a chat at the close of the Exhibition, a 'Star' representative drew from the Queensland Commissioner some details regarding his career. It appears that Mr. Mobsby is easily one of the most experienced and trusted of the overseas representatives, in that he has been associated with exhibition work all his life.

"It was as a lad that Mr. Mobsby got his first taste of the work when he accompanied his father in his official capacity to the Agricultural Exhibition on the Goldsmid Estate at Hove, Brighton, England. But his first personal connection with any exhibition was when he assisted Mr. A. G. Graysmith, artist, at the Royal Pavilion Building in Brighton. And after studying in art and design and in chemistry, and following a course of general commercial training, he practised as an artist and designer, and was on the instructional staff in decorative art and photography at the Central Technical College.

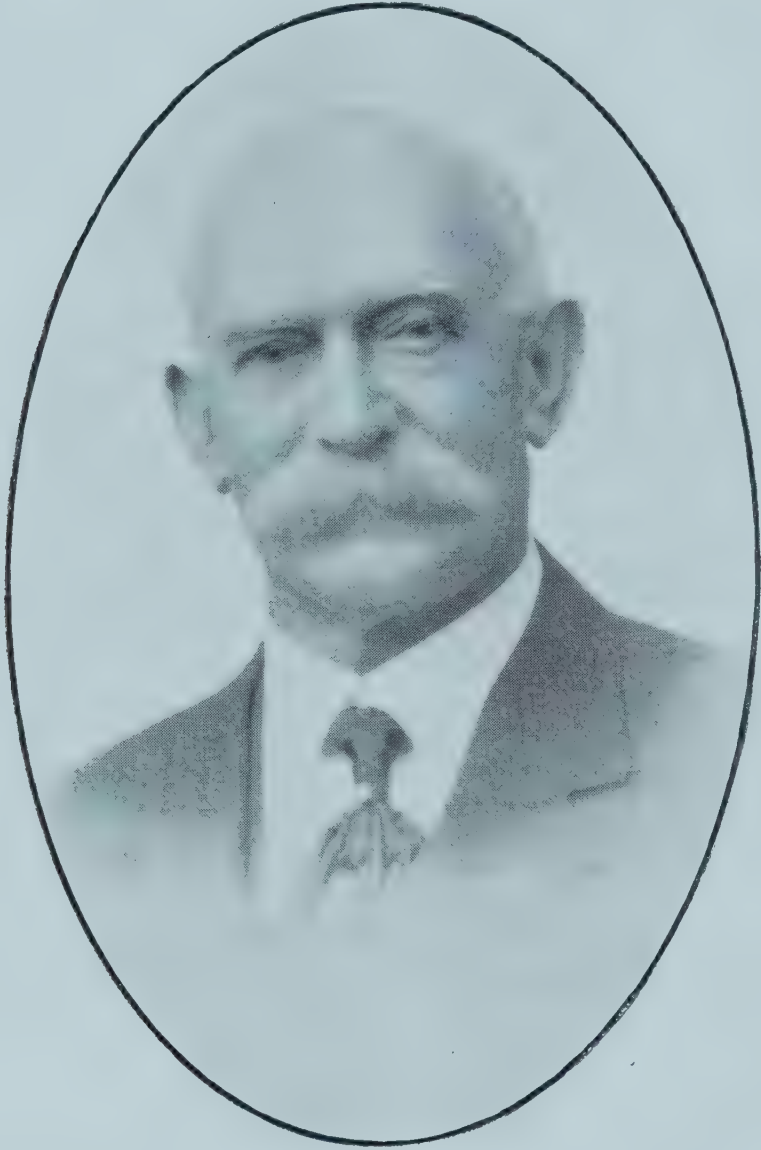


PLATE 86.—MR. H. W. MOBSBY, F.R.S.A., F.R.G.S.,
Queensland Government Representative at the New Zealand
and South Seas Exhibition at Dunedin, 1925-26.

"But this is not all. Mr. Mobsby's success at home qualified him for similar work abroad, and he has had charge of Queensland's interests at the Franco-British Exhibition, London; at the Panama-Pacific Exposition, San Francisco; at the British Empire Exhibition at Wembley; and now at the New Zealand Exhibition at Dunedin.

"Since 1897, however, Mr. Mobsby has been attached to the Department of Agriculture and Stock in Brisbane as Government Artist and Photographer, and it is during that period that he has become so closely connected with his State's representation at various exhibitions. Not only has he looked after Queensland's interests at the Australian Natives' Association's Exhibitions at Melbourne for several successive years, but also at Adelaide and Sydney, and at the Annual National Show at Brisbane.

"That he has not held these position except on merit is proved by the fact that he holds a number of diplomas, certificates, and fellowships which have been

gained in fields which have fitted him for his work. These include senior diploma, Chamber of Commerce (England); senior diploma, City and Guilds Institute (London); senior diploma, Cripplegate Institute (London). For Theoretical and Practical Photography: Certificate for drawing, South Kensington School of Arts (Brighton); certificate for motion picture work (San Francisco). He is also a medallist at the World's Photographic Competition, 1906; grand prix, Franco-British Exhibition, 1908; diploma and medal for photography at P.P.I. Exposition (San Francisco), 1915; and diploma and medal for distinguished services at the P.P.I. Exposition, San Francisco.

"It is safe to say that the many friends of Mr. Harry Mobsby has made in Dunedin did not realise that the little gentleman from Queensland with the grey moustache and the friendly, unassuming manner was such a much-travelled and widely-experienced man of the world. He did not tell them of his successes; it is not his way. But, nevertheless, those with whom he came in contact felt they had made a friend, and, now that the Exhibition is at an end, they will part with him with regret."

THE QUEENSLAND BANANA AND SUGAR INDUSTRIES.

MINISTER'S COMMENT ON A VISITOR'S CRITICISM.

The Minister for Agriculture (Hon. W. Forgan Smith), in the course of a recent Press statement, commented as follows on some critical remarks by a member of the Imperial Parliamentary Delegation on Queensland industries:—

"I note by the Press that Sir Sydney Henn, a member of the Empire Parliamentary Delegation, has been commenting on the banana and sugar industries of Queensland. Sir Sydney complains that he has not seen first-class bananas since he has been in Australia. In this respect Sir Sydney Henn appears to have been unfortunate, and if he comes again to Queensland I will see to it that he is provided with an opportunity of seeing as fine bananas as are grown in any part of the world. The "Gallant Knight" is apparently much concerned about the prohibition of the importation of Fijian bananas into Australia. Surely this is a matter for Australian Governments to decide, and I do not think that any one will admit that Sir Sydney Henn is sufficiently acquainted with Australian conditions to pose as an authority as to what our fiscal policy in Australia should be. I would remind him that Australian Governments are concerned with Australia, and not primarily with Fiji. He might also be well advised to inquire into the prevalence in Fiji of such things as the Sigatoka disease.

"The tourist also turned his attention to the Queensland sugar industry, and there again indicates his lack of understanding of the conditions now prevailing. The Queensland sugar industry is carried on by white labour, the sugar produced in Australia is equal to the finest in the world, and Australia is the only country where the industry is carried on by white labour. That being so, it is necessary to afford adequate protection for the industry, so that it should not be subject to the competition of the product of countries where living standards are much lower than is approved of here. This industry has been of immense advantage, not only in the development of North Queensland, but to Australia generally. The price of sugar for many years has been based very largely on Australian costs of production, and I would remind those who listened sympathetically to Sir Sydney Henn in the South that during the war period Australia was the only country where sugar was not rationed, and where the prices were the lowest in the world at that time. World's parity may be an accepted fetish of free-traders, but it is not regarded favourably by those whose responsibility it is to lay down fair methods in Australia. I would remind Sir Sydney Henn also that there is no legal restriction on the output of sugar in Queensland. Any restriction that operates is based on the capacity of mills to accept and treat cane. In any case it is well to remember that manufacturers and business people generally do not, as a rule, continue producing for an over-stocked market. Why, therefore, should farmers be expected to produce in excess of requirements? In Cuba, under a law approved of recently by the United States Government, restriction of areas to the extent of 10 per cent. was imposed. Uba cane referred to by Sir Sydney Henn is grown extensively in South Africa, because it suits the conditions prevailing there. It is a variety not looked upon with favour by mill managers and sugar chemists here, who presumably understand their business in this regard.

"The remarks generally of this visitor are in accord with those usually given by tourists who are not here long enough to get a proper understanding of the conditions which they presume to criticise. The 'Gallant Knight' would be well advised to confine his remarks regarding Australian conditions to those matters which he has taken the trouble to study and fully understand."

MAIZE IMPROVEMENT.

By C. J. McKEON, Assistant Instructor in Agriculture.*

The principal part of the year's activities embraced both the technical and practical field work connected with the Departmental scheme of seed maize improvement. It is gratifying to be able to report that, notwithstanding the indifferent season experienced in many districts, excellent yields were obtained from the propagation plots in the Kilcoy and Mary Valley areas, and large stocks of high-class seed were selected for distribution.

After carrying on the Departmental maize breeding and seed selection work for several years, the opinion has been formed that a marked improvement has taken place in the type and quality of the different varieties employed, and the high yields obtained in the field trials have unmistakably demonstrated the value of propagating high-yielding strains of seed.

Up to the time of submitting the previous report some of the maize plots had not reached maturity, and the undermentioned details were unavailable:—

Grower.	Variety.	Area.	Yield per Acre.
		Acre.	
J. Tinney, Kilcoy ..	Improved Yellow Dent	5	Damaged by flood ; no yield taken
A. J. Casten, Hivesville	Funk's 90 day ..	5	70 bushels
G. B. Mouatt, Kilcoy	Star Leaming	3	Failed through dry weather
A. Ind, Beaudesert ..	Golden Beauty ..	3	Failed through dry weather
J. Richards, Kilcoy ..	Golden Beauty ..	4	60 bushels
E. Witton, Manyung	Funk's Yellow Dent ..	14	50 bushels
W. Beverley, Boonah	Improved Yellow Dent	5	Failed
F. Turnbull, Kandanga	Improved Yellow Dent	8 and ear to row	

Seed Maize Improvement.

Although the maize crop for Southern Queensland, on the whole, will be a very light one, due to the dry conditions experienced in most of the principal maize-growing districts, the results from the Departmental plots, under the circumstances, can be considered very satisfactory.

The yields on the whole were not high, but very few of the plots were total failures, and at the end of the season sufficient seed to sow approximately 4,000 acres will be available for distribution to farmers. The whole of the seed selected was grown in the Mary Valley and Kilcoy districts, the crops in the other districts where plots were established being too light, owing to dry weather, for seed purposes.

Cutworms were responsible in a number of cases for the light yields, as many of the plots were attacked when the plants were only a few inches above ground, and considerable damage done.

In the Kilcoy district parrots were very troublesome, and in two or three cases practically every ear in the whole crop was more or less damaged. The damage was not only done by king parrots, which usually attack corn, but more so by Blue Mountain parrots, which usually confine their attention to sorghums. The scarcity of sorghums crops in this district was probably responsible for this.

The damage caused by the maize grub, regarding both plants and ears, was again very light. None of the plots showed any signs of blight. Weevils also caused much less damage than usual, except in one case where the crop was left in the field too long. The reduction in damage was due, perhaps, not so much to the fact that weevils were less prevalent than usual, but because growers are beginning to realise the necessity of picking the crop as early as possible, especially those crops ripening early in the season. Each season it is becoming more apparent that maize-growers are beginning to recognise the benefit of using pure strains of seed, and also to recognise the value of the seed maize improvement work which has been carried out by the Department for a number of years past. This is admitted, not so much in words, but from the fact that farmers with whom the plots are established receive numerous inquiries from local growers for supplies of seed from what is left

* Abstracted from the Annual Report, Department of Agriculture and Stock, Queensland, for year ended 30th June, 1926.

after the best of the seed has been picked out by Departmental officers. The fact that the Departmental supplies of seed have never yet been equal to the demand is also proof of this.

Although the total area of the plots sown this season was little more than half the area sown the previous season, due to dry conditions in some districts preventing arrangements being made for more plots, the amount of seed selected was greater than any previous season, and the quality and type of grain was more than satisfactory.



PLATE 87.—MR. C. J. MCKEON, ASSISTANT INSTRUCTOR
IN AGRICULTURE,

Whose work in Maize Improvement, under the direction of Mr. H. C. Quodling, Director of Agriculture, has helped to win a high reputation for Queensland-bred grain.

Eighteen individual plots were sown, and these totalled $84\frac{1}{2}$ acres, of the following varieties:—

Funk's 90 Day, $8\frac{1}{2}$ acres; Star Leaming, 13 acres; Reid's Yellow Dent, 7 acres; Golden Beauty, 14 acres; Red Hogan, 4 acres; Improved Yellow Dent, 36 acres.

Some small plots were also sown with the strains that are being worked up with the idea of testing them out under North Queensland conditions. An "ear-to-row" test of each of the standard varieties, with the exception of Red Hogan and Reid's Yellow Dent, was also sown, the ears selected for the test plot of the latter variety being too badly damaged by weevils to be worth sowing.

Only three plots out of the total number sown failed to develop grain sufficiently good for seed purposes.

Funk's 90 Day.

This variety is becoming more popular each season, and in every district in which it has been tried it has been very highly spoken of, both by the growers and by local farmers who have seen it growing.

Three plots were sown, two in the Kilcoy district and one in the Mary Valley district. One of the former did particularly well and gave the very fine yield of slightly over 80 bushels per acre. The type and colour of grain and the size of the ears were very good. The field characteristics, on the whole, were very good, and show a very great improvement, particularly the husk covering. The other crop grown in the Kilcoy district suffered during the early stages of growth from dry weather. Germination was also irregular from the same cause. Portions of the crop where the land was better worked yielded very well, whilst other portions on the rougher land were only light. The ear-to-row test plot was sown in the centre of this plot, but was very irregular in germination and growth, and the ears were too small and irregular for further ear-to-row test work.

The plot sown in the Mary Valley district suffered right throughout from dry weather, and this, together with the heavy damage suffered by the young plants from cutworms, was responsible for the light yield. Portions of the area were so badly eaten out that the land had to be ploughed up and another crop sown.

Star Leaming.

Three plots were sown, two of which germinated poorly and consequently yields were light. Both crops also suffered from dry weather and were badly damaged by parrots when the grain was in the milk and dough stages. Owing to the light stand, and the excellent condition of the land when the seed was sown, the plants had a better chance of withstanding the dry weather and developed very large ears. The type of grain was very fine, and a fair quantity of good seed was selected from both plots.

The other plot, although patchy where cutworms had attacked the crop when young, did very well, and yielded slightly over 70 bushels per acre. The crop unfortunately was left too long in the paddock and was considerably damaged by moths and weevils, so the yield, all things considered, may be regarded as very good.

The ears were large and the type and colour of the grain was splendid. As 110 bushels of seed were selected from the crop—after discarding a large percentage of otherwise good ears owing to damage by weevil and moth, particularly the latter—it will readily be seen how even the type was.

The field characteristics were good, and are perhaps the best of any of the varieties.

The "ear-to-row" test plot gave fairly good results, the yields varying from 52.71 bushels per acre to 92.25 bushels per acre.

Reid's Yellow Dent.

Only one plot of this variety was sown and the result was good. The ears were very large, and, for this variety, were well covered. The grower remarked on the improvement in the husk covering, and it is to be hoped that this improvement will continue, as this is the only real defect in an otherwise wonderfully good corn.

As usual the type was very regular.

The grower, so far, has not advised as to the actual quantity of grain threshed, but the yield will not be under 75 bushels per acre. This yield is not nearly as high as some of the previous yields from this variety; but portion of the crop, which was sown a fortnight later than the first sowing, was much lighter owing to absence of rain during tasselling.

Golden Beauty.

One of the three plots of this variety failed owing to dry weather, and the other two gave fairly good yields. Both of these crops made splendid growth, and promised a very heavy yield, but the weather conditions during tasselling were very hot and dry, and consequently the yields were lighter than they would otherwise have been. The type of grain was very good, but naturally the ears were not as large as usual.

Field characteristics were good on the whole, and the position of the ears continues to improve, although there is still room for further improvement in this respect.

This variety has done particularly well in the Kilcoy district, and is now a very popular variety there. In the past great difficulty has been experienced in persuading farmers who do not know the variety to grow it, but in every case where it has once been grown the farmers have expressed a keen desire to continue growing it.

Results so far have proved that it is one of the best drought resisters of any of the varieties, and the grain when shelled makes a most attractive looking sample.

The "ear-to-row" test, in keeping with the rest of the plot, did not give any heavy yields, the best being 77 bushels per acre and the lowest 43.85 bushels per acre.

Improved Yellow Dent.

This is probably the most popular variety grown in Queensland to-day, the heavy yield and the large bright grain appealing to maizegrowers, and no difficulty is ever experienced in getting areas of land for all the plots required by the Department.

Four large plots were sown and one, after making great growth, was ruined for seed by hot winds whilst out in tassel. Two plots were harvested with good results, whilst the fourth remains to be harvested. A large quantity of seed was selected from the two plots so far harvested, the type and colour of the grain being particularly good. The ears were very large, and some of the best of these were secured, and when weighed were found to be from 1 lb. 2 oz. to 1 lb. 6 oz. each. The yields in both plots worked out at approximately 75 bushels per acre. One plot was damaged, just after sowing, by bandicoots, and the other by cutworms, and consequently they were rather patchy in places. Very few of the ears were damaged by weevil—due partly to ripening late in the season but more so to the exceptionally good husk covering. Although the majority of the field characteristics were good, there is room for considerable improvement in the height of the ears, a large number being carried far too high.

Half of the "ear-to-row" test plot was resown on three occasions owing to kangaroo rats digging out the seed and then was destroyed. The remainder was more or less damaged and of no use for comparison purposes.

Red Hogan.

Only one plot was shown, and was a failure owing to dry weather. This crop looked very promising up to the tasselling stage, but hot dry winds destroyed the pollen.

Unnamed Selections.

Two one-acre plots and a small plot were sown with strains which are being worked up in connection with the proposed seed maize improvement scheme for the Atherton Tableland.

One of the larger plots was practically ruined by dry weather, and the others were only light from the same cause. Parrots were also very troublesome and did considerable damage. The results, however, were more than satisfactory, the type of grain being much more regular than was expected. The ears were small owing to the dry weather, but the quality of the grain was good.

A detailed list of plots is appended.

General Duties.

During the past year the following places were visited on instructional and work other than seed maize improvement work:—

Kilcoy, to judge at the Show and to give advice on making stack silage.

Mount Garnet, to report on the suitability of the district for growing seed maize.

Atherton Tableland, in connection with the proposed seed maize scheme.

Runcorn and Cooroy on several occasions, in connection with the pasture improvement plots established in those districts.

Boonah, Kalbar, Wangalpong, and Beaudesert, to make arrangements for the carrying out of dairy and pig fodder trials.

. Mount Walker, to give advice on silage.

With regard to stack silage, officers of this Department have given demonstrations at different times in all of the principal districts where maize-growing is carried on in conjunction with dairying, and are constantly pointing out to dairymen the necessity of making provision for the winter by conserving fodder in some form, and it is remarkable that in such a season as the past one, during which thousands of acres of splendid crops of maize were ruined for grain, but which would have made excellent silage, very few stacks of silage were seen. In most cases the stalks were either cut and thrown out to stock, with the result that much of it was wasted, or were left to mature a very light crop of pinched grain, which would in many instances barely pay for picking.

Variety.	Grower.	Area.	Yield per Acre.	Extracts from Reports.
Funk's 90-day ..	T. W. Dunning, Kilcoy	3 acres ..	80 bushels ..	First sowing made 2-11-25 and the second sowing a couple of weeks later. The ground for both plantings was in very fine condition. Plants made very good growth and averaged about 9 ft. in height. Second sowing missed the rain when cobbing and was too pinched for seed purposes. First sowing did splendidly and gave a very good yield. Field characteristics were very good, particularly the husk covering, which shows a great improvement. Type and colour of grain were good. Ripening was fairly even. Selections were made in the field from early maturing plants possessing other desirable features and sufficient seed for next season's plot requirements was secured. One of the best crops of this variety to date. Period of maturity 108 days.
Furk's 90-day ..	J. Tinney, Kilcoy ..	3 acres ..	50 bushels ..	Sown 1-10-25. Weather was very dry for several weeks after planting and crop had a hard time. Crop responded well when rain fell, but patches, where the ground was a bit rough, had received too big a check to properly recover. This reduced the yield considerably. Ears on the whole were only of medium size but the type of grain was good. Husk covering much improved. A number of plants carried ears with exceptionally long shanks. This is a peculiarity of the variety and appears very hard to breed out. Selections were made from early maturing plants and about 3 bushels of seed were secured. Ear to row test was harvested, but the growth was too uneven and the germination too irregular to be of any use for comparison purposes. Period of maturity 113 days.
Funk's 90-day ..	H. Roselund, Imbil	2½ acres ..	No yield taken	Sown 26-12-25 and germinated very well. Over half the crop was completely destroyed by cutworms just after germination and the remainder was badly damaged. Crop suffered from want of rain throughout and only gave a light yield.
Star Learning ..	G. Meyers, Imbil ..	6 acres ..	70 bushels ..	Sown 2-11-25 and germination was only fair. Crop made good headway right throughout. Cobs were very large and very regular in type. Plants were between 9 ft. 6 in. and 9 ft. 10 in. high and of very upright growth. Portion of area was patchy owing to cutworms, but the remainder was very fair. Very fair quality seed was selected. Crop left too long in the field and a lot of damage was done by moth and weevil. Period of maturity 130 days.

Extracts from Reports.

Variety.	Grower.	Area.	Yield per Acre.	
Star Learning	T. A. Beanland, Kilcoy	3 acres	40 bushels (approx.)	Sown 6-1-26 on a very nicely prepared piece of land. Germination was very poor for some unknown reason, and would not be more than a 50 per cent. strike. Dry weather prevailed practically throughout growth and only the splendid state of the land at planting time and the thin stand was responsible for any crop at all. All things considered the crop did remarkably well to produce ears of such size and quality as it did. The supply of seed available was very limited, but what there was of it was of very good quality. Period of maturity 138 days.
Star Learning	G. B. Mouatt, Sandy Creek, Kilcoy	4 acres and "ear to row"	30 bushels (approx.)	Sown 18-11-25 and germinated very poorly. Ear to row germinated much better. Weather conditions throughout were very unfavourable. Considering this the crop made good headway and developed very fair ears. Quality and type of grain were very good. Parrots played havoc with the ears and practically every ear was more or less damaged. Seed selected was of very good type. Ear to row test was sown in the centre of the plot and was not damaged to the same extent as the bulk of the surrounding plot; yields in this were good considering. Time of maturity, 138 days.
Reid's Yellow Dent	F. Turnbull, Kadanga	7 acres	75 bushels (approx.)	Sown at the end of September and germinated well. Second sowing of about 1½ acres made a couple of weeks later. Plants made very strong upright growth and cobbled very well with the exception of the second-sown portion, which had very hot weather during tasselling. This was much lighter and reduced the yield for the whole area. Ears were very large and well filled. Grain was very true to type. Husk covering very good for this variety. Field selections were made and about 6 bushels of very fine seed was selected. This variety does particularly well in this locality. Period of maturity, 122 days.
Golden Beauty	J. Richards, Sandy Creek, Kilcoy	4 acres and "ear to row"	50 bushels	Sown 18-11-25 on a very well prepared piece of land and a splendid germination resulted. Crop made very fine growth, plants reaching a height of 10 ft. 6 in. and looked very promising until dry weather set in during tasselling. Ears were small, but grain was of good type. Field characteristics were good. Position of ears much improved. Ear to row test yields were fair, varying from 43·85 bushels per acre to 77 bushels per acre. Period of maturity, 146 days.

Variety.	Grower.	Area.	Yield per Acre.	Extracts from Reports.	
Golden Beauty	G. B. Mouatt, Kilcoy	6 acres	60 bushels	Date of sowing not kept. Germinated wonderfully well, hardly a grain missing. Made very fine growth and cobbled very well. Had weather conditions been more favourable during the cobbing stage the yield would have been very good. Ears were of medium size and were very well filled. Field characteristics on the whole were good. Position of ears is still slightly irregular, but shows an improvement. Type of grain was very fine and the seed selected was of as good type and quality as any seed of this variety to date.	
Improved Dent	F. Turnbull, Kangadanga	10 acres and "ear to row"	75 bushels	Sown 15-11-25 and portion germinated splendidly. The other portion was eaten out by kangaroo rats and was resown, but was again practically eaten out. Crop made very good growth, plants reaching a height of 11 ft. Cobs on the whole were large and the type and colour of grain was excellent. Field characteristics, with the exception of the position of the ears, were good. Many of the ears were carried far too high, and there is room for considerable improvement in this respect. Ear to row test plot was sown but was too badly damaged by rats to be of any use for record purposes. Half of the rows were completely eaten out and were resown three times with the same result. The balance were more or less damaged. Period of maturity, 152 days. Half the area was sown on 28-11-25 and the balance on 12-12-25. Both germinated splendidly, but cutworms thinned out the plants considerably, particularly in the first sown plot. First sowing made splendid growth and cobbled very well. Ears were large and particularly well covered. Height of ears was very irregular. Other field characteristics were good. Plants were very tall and upright. Second sowing did very well up to the tasselling stage, but suffered from then on from dry weather. Ears were small and the grain was too pinched to be used for seed purposes. No seed was selected from this. The yield given was estimated from the first sown portion. Period of maturity, 156 days.	
Improved Dent	C. Behrendorff, Boonah	9 acres	..	This was a most promising looking crop up to the tasselling stage. Very hot, dry weather prevailed during this period, and the result was a very light crop of grain. Ears were very small and poorly filled and of no use for seed purposes.	
Improved Dent	J. Tinney, Kilcoy	5 acres	Not harvested	Sown 12-1-26 and germinated well. Weather conditions were very unfavourable, practically no rain falling after planting took place. Crop did very well considering. Plants naturally were much shorter than is usual for this variety. Ears on the whole are small, and it is expected that much of the grain will be pinched. This will be only a light crop. Crop ruined for grain by dry weather.	
Red Hoga	W. Boverley, Boonah	4 acres	Failed		

"EAR TO ROW" TEST—STAR LEAMING.

Row No.							Yield per Acre. Bushels.
403 x 141	..	..	..	..	..	..	61.5
403 x 142	..	..	..	..	..	..	70.28
403 x 143	..	..	..	..	..	..	55.64
403 x 144	..	..	..	..	..	..	67.35
403 x 145	..	..	..	..	..	..	73.21
403 x 146	..	..	..	..	..	..	52.71
403 x 147	..	..	..	..	..	..	61.50
403 x 148	..	..	..	..	..	..	92.25
Check	..	..	..	..	..	..	55.64
403 x 149	..	..	..	..	..	..	77.60
403 x 150	..	..	..	..	..	..	79
403 x 151	..	..	..	..	..	..	64.42
403 x 152	..	..	..	..	..	..	82
403 x 153	..	..	..	..	..	..	73.21
403 x 154	..	..	..	..	..	..	55.64
403 x 155	..	..	..	..	..	..	74.67

Sown 18-11-25; ripened 11-4-26; period of maturity, 138 days (five days allowed for germination).

"EAR TO ROW" TEST—GOLDEN BEAUTY.

Row No.							Yield per Acre. Bushels.
410 x 121	..	..	..	..	..	..	57.14
410 x 122	..	..	..	..	..	..	66.44
410 x 123	..	..	..	..	..	..	77
410 x 124	..	..	..	..	..	..	63.78
410 x 125	..	..	..	..	..	..	50.49
410 x 126	..	..	..	..	..	..	45.18
410 x 127	..	..	..	..	..	..	57.14
410 x 128	..	..	..	..	..	..	69.09
410 x 129	..	..	..	..	..	..	51.82
Check	..	..	..	..	..	..	51.82
410 x 130	..	..	..	..	..	..	54.48
410 x 131	..	..	..	..	..	..	61.12
410 x 132	..	..	..	..	..	..	75.74
410 x 133	..	..	..	..	..	..	57.14
410 x 134	..	..	..	..	..	..	57.14
410 x 135	..	..	..	..	..	..	43.85
410 x 136	..	..	..	..	..	..	54.48
Check	..	..	..	..	..	..	55.81

Sown 18-11-25; ripened 19-4-26; period of maturity, 146 days (five days allowed for germination).

DRY SEASONS—A COUNTERING FIELD CAMPAIGN.

By A. E. GIBSON, Instructor in Agriculture, and C. S. CLYDESDALE, Assistant Instructor in Agriculture.

The loss of national wealth to this State brought about by periods of drought cannot be accurately estimated by figures—but their effects are undoubtedly far-reaching. If action can be taken over certain areas whereby increased production can be brought about, it naturally follows that dry periods are robbed to some extent of their devastating influences and the loss to the State as a whole is decreased. A policy of this kind is naturally educative in its character to all, but when certain sections are dealt with it becomes more particularly of value to those directly interested, and this is increased when illustrations are given for the purpose of proving the policy advocated.

For some time past the Department of Agriculture and Stock has interested itself in increased production of dairy and allied products, and with this object in view has initiated a series of fodder trials in various districts for the purpose of pointing out that if means are adopted for the annual provision of fodder crops for dairy stock and pig raising, the fluctuations which have in the past taken place in the supply of these products will be considerably reduced if not entirely removed.



PLATE 88.—PEAS AND PILOT WHEAT AT BEAUDESERT.

Weight—10 tons 13 cwt. 2 qr. 19 lb. per acre.



PLATE 89.—PEAS AND FLORIDA WHEAT AT BEAUDESERT.

Weight—11 tons 17 cwt. 2 qr. 20 lb. per acre.



PLATE 90.—PILOT WHEAT AND PEAS AT P. CASWELL'S, WANGALPONG
(FODDER PLOTS).



PLATE 91.—FLORIDA WHEAT AND VITCHES AT P. CASWELL'S, WANGALPONG
(FODDER PLOTS).

During the past few months the losses to dairymen and others, brought about by lessened production resultant of the dry period experienced, amounts to a considerable value, and attention is drawn to the fact that these can be considerably reduced by adopting the policy of careful soil preparation and the sowing of crops calculated to fill the void caused by the absence or decreased supplies of natural grasses and herbage.

It was with such an object that dairy and pig fodder trials were established on the farms of Messrs. F. W. Thiedeke and Peel Caswell, of Beaudesert and Wangalpong, respectively, and results obtained so far from portions of these plots have proved the soundness of the principle involved. Both farmers are capable agriculturists whose methods of cultivation leave little to be desired, and who are fully seized of the importance of fallowing and thoroughly preparing their land prior to seeding operations. The results obtained on the comparatively low rainfall experienced at Wangalpong speak for themselves; and whilst the soil at Beaudesert is of a heavier nature than that met with in parts of the Canungra Valley, the heavier rainfall experienced more than compensated for the difference in soils and their moisture retaining qualities.

The plots were planted on the 9th and 10th June at Mr. Thiedeke's at Beaudesert, whilst those at Mr. Caswell's, at Wangalpong, were planted on the 12th and 14th of June. Rainfall experienced between the 9th June and 23rd September (the date of harvesting) at Mr. Thiedeke's being 3.66 inches, but it must be noted that a fall of 1.06 inches was experienced on 7th June, two days prior to planting. At Mr. Caswell's the rainfall received between the 12th June and 24th September totalled .91, the previous rains to that date being 1.25 inches, registered on 14th and 17th May.

The following weights of green fodder were recorded:—

	Mr. F. W. Thiedeke, Beaudesert.						Mr. P. Caswell, Wangalpong.			
	Tons	cwt.	qr.	lb.			Tons	cwt.	qr.	lb.
Florida wheat and peas ..	11	17	2	20	..		7	6	1	22
Florida wheat and tares ..	10	8	3	13	..		7	4	0	5
Pilot wheat and peas ..	10	13	2	19	..		8	5	2	17
Pilot wheat and tares ..	10	4	0	7	..		6	12	0	5
Skinless barley and peas ..	11	8	0	8	..		6	4	3	10
Skinless barley and tares ..	4	16	0	3	..		7	1	2	16
Cape barley and peas ..	6	2	1	21	..		4	18	1	20
Cape barley and tares ..	9	7	1	1	..		4	16	0	3
Rye and peas ..	..	5	15	0	27	..	4	16	1	20
Rye and tares ..	..	8	0	3	11	..	3	7	0	25

The varieties of wheats used in the trials were Pilot, a Bunge-Florence crossbred, and Florida, a Bobs-Florence crossbred, both of which were raised at Roma State Farm. These varieties made excellent growth, and were remarkably even throughout the trials. At the time of harvesting both varieties were in the flowering stage, averaging 3 feet 6 inches in height.

At Wangalpong both Pilot and Florida showed signs of flagrust, but at Beaudesert no signs of rust were apparent. This was probably due to local conditions and to the fact that humidity in the Canungra Valley is greater than in the more open areas around Beaudesert.

Cape Barley.—This crop made fair growth, and when harvested was in the shot-blade stage—the height averaging 1 foot 9 inches of good healthy growth. From the general appearance of the crop a later cutting will give a heavier yield.

Skinless Barley was a clean and attractive crop, averaging 3 feet in height, which had made a remarkable growth of foliage. When harvested the grain was in the soft dough stage.

Rye.—In each case this crop made rapid growth, and was in the flowering stage when harvested, averaging 3 feet in height. Generally speaking, growth was somewhat on the thin side, and heavier quantities of this cereal should be sown when the season is somewhat advanced, as it was in this particular instance.

Field Peas in all plots made fair average growth of 1 foot 6 inches in height. When harvested they showed signs of wilting, thus reducing the weight per acre that under other conditions would have been recorded.

Vetches, usually rather slow in maturing when compared with peas, made favourable growth.

COTTON PLANTING.

The recent rains which came at a most opportune time have enabled excellent strikes of cotton to be secured in many of the districts. Reports received by the Department from the Field Officers indicate that exceptionally good strikes are being obtained in the sowings which have just been coming through during the past week. Such splendid results demonstrate the soundness of the Department's advice on the early preparation of the seed bed. Farmers who have had their seed beds prepared for some considerable length of time report that the rains penetrated well below the surface soils. This will assist in the development of a deep tap-root system, which will enable the young plants to resist periods of hot winds and dry weather during the next few weeks.

Examinations on some late prepared fields show that where ploughing has been fairly deep, a dry layer of loose soil exists on top of the subsoil. If a strike is obtained on such a seed bed, further rains are necessary within a week or two if the plants are to survive.

At the Callide Cotton Research Station in the Callide Valley, last season's cotton plants were cut down during the first part of July, then stacked and burned. Owing to no frosts having occurred the plants were in leaf and all of the top crop of bolls unopened. It is estimated that at least 100 lb. of seed cotton per acre was lost by cutting the plants at this stage. However, it was believed that the results to be obtained in the coming season's crop, through early preparation of the seed bed, would more than compensate for the loss. In addition to this advantage, enormous numbers of the "stainer" bugs and any pink boll worms, peach grubs or corn ear worms which might be present, were destroyed. Ploughing was effected following the destroying of the plants.

The seed bed was prepared by rolling to break up the dry clods and then harrowing. Following the rains a thorough harrowing was performed and planting took place immediately afterwards.

Excellent strikes have been obtained on the plots which were treated in the above manner and it is anticipated that with another rain in the near future the crop will be sufficiently established to go for a considerable length of time before receiving further rains.

On a small plot on the Station the preparation of the seed bed could not be effected until a somewhat later period than for the rest of the Station. Examination showed that the recent rains had not given sufficient moisture, owing to the seed bed being of an open and unsettled nature, to afford any assurance of a strike being maintained if one had been secured. It will be necessary, therefore, to wait until the occurrence of more rain before planting, whereas the same rain will thoroughly establish the strike which has been obtained.

Where insufficient rain fell to effect the securing and establishing of a strike, decided assistance has been given in the preparation of a good seed bed. It is to be hoped that the cotton growers will not allow the feeling of uncertainty, which exists as regards the prices to be obtained for this season's crop, to influence them to the extent of seriously reducing their acreages. In the event of good planting rains falling in the near future it is suggested that the growers should plant acreages which they can properly thin and cultivate. Under such a system the chances of obtaining good yields of high quality cotton are greatly increased. It is believed that in obtaining such results the future of Queensland's cotton crop is assured.

The cost of producing cotton in Queensland compares favourably with the average values in the United States of America. The quality of the cotton more than compares favourably with the average quality of the United States of America cotton crop. The greatest difference is that our picking charges are practically double of those in the American crop. These charges were brought about in the seasons of 1923-24 and 1924-25 by the employing of pickers in fields of poorly grown cotton where sufficient cotton could not be picked by the inexperienced pickers to return them a wage comparable with the basic wage unless the rate was 2d. per lb. of seed cotton. The standard of cultivation has improved to a marked degree since then, and furthermore, the more uniform Durango variety of cotton is being grown over the whole of the belt. These factors, taken into consideration with the fact that the pickers are becoming more experienced, have considerably raised the rate of picking. A 100 lb. of seed cotton a day used to be considered good picking two years ago, whereas during this past season 100 lb. a day was very ordinary picking, many tallies of 150 to 180 being reported and in one case 300 lb.

It can be seen, therefore, that the present high rate for picking is not justifiable as compared to former years, especially in view of the reduced prices which are liable to be received this season. Under the circumstances it is possible that some reduction

may be effected, especially if the growers do not ask the pickers to start work until there are a sufficient number of open bolls per plant to enable a good tally to be obtained.

It is believed that if the growers pay more attention to the improving of their methods of cultivation, such as using the most efficient and labour-saving machinery, that the reduced cost of cultivation per acre in conjunction with the increased yield, will materially reduce the cost of production per lb. of seed cotton. If some reduction can be effected in the cost of picking, it is anticipated that cotton growing can be made a profitable enterprise in spite of the low world's prices which are existing to-day.

WHEAT AND PASTURE IMPROVEMENT.

By C. S. CLYDESDALE, Assistant Instructor in Agriculture.*

In the season under review the wheat crops throughout the State compared very favourably with those of past seasons.

Wheat crops generally in the early part of September were giving great promise of a record yield, but the late frosts experienced on the 18th and 24th September did considerable damage on the low-lying and exposed country. This setback, followed by a continuation of the dry weather, proved detrimental to these latter crops, which in some instances proved a complete failure as far as grain was concerned. However, the incidence of these two factors was not so pronounced elsewhere, especially on the more elevated country, with the result that average yields were good and many individual crops gave splendid returns.

The variety "Florence," which at the present time is undoubtedly the most popular kind amongst the wheat farmers on the Darling Downs, suffered a good deal of damage this year from frost, when grown on the low-lying country.

Gluyas and Canberra did well; these being mid-season varieties and slower in development were not affected to the same degree as Florence. Yields of from 13 bags of Canberra were obtained, 7 and 8 bags being quite common, and Gluyas also gave good returns.

Novo (Bunge x Indian Pearl 9), a Roma crossbred, did well generally. In one instance which came under notice a crop in the Allora district planted at the end of June gave a remarkable return of 14 bags per acre. Splendid results were also obtained during the season from Pusa 4 wheat. It is interesting to note that this variety was introduced about sixteen years ago by the Department of Agriculture from Pusa, India, and after thoroughly testing it out on experiment plots over several seasons, it was grown under field conditions in the Allora district. Since then its cultivation has been extended. Last year there were several thousand acres cropped with this particular variety. It has one disadvantage—susceptibility to frost. Growers who planted it on low-lying situations suffered loss through the late frosts in September. On slopes and ridges, high returns of excellent grain were obtained, many yields ranging from 10 to 15 bags per acre. Wheat of this description should obviously be grown on the higher lands wherever possible.

Wheat Plots.

The field work connected with the wheat propagation plots was carried out at Allora, Southbrook, Inglewood, Jandowae, Kaimkillenbun, Pittsworth, Pratten, and Murgon. Actually, a continuation of the wheat plot work which the department has been carrying on for a considerable number of years.

With few exceptions, these wheats were bred at Roma State Farm and are first tested out in nursery plots, under field conditions, before being transferred to the propagation plots. Planting was carried out from 28th May to 18th June, 1925. In all districts good moisture was present and excellent germination resulted.

Seed which was treated with carbonate of copper at the rate of 1 oz. per bushel as a bunt preventive was sown at the rate of 45 lb. per acre, and the resultant crops were absolutely free from bunt. Nineteen varieties were tested out, representing 63½ acres, from which pure supplies of seed were drawn for future operations.

In localities affected by the drought, notably at Inglewood and Pratten, only a little more than seed was obtained, but elsewhere the yields were fairly good. The

* Abstracted from the Annual Report, Department of Agriculture and Stock, Queensland, for year ended 30th June, 1926.

highest ones, Florida and Pilot, gave a return of 37 and 33½ bushels per acre respectively at Murgon, where a good deal of interest is being shown in wheat-growing.

Nursery Plots, Season 1925.

Last year, at each of several centres where field tests were carried out, small nursery plots ranging from 28 to 88 varieties were established, interesting results being obtained.

The wheat which stood out prominently last year was planted in plots one-eighth of an area this year at Allora for observation and for the propagation of additional quantities of seed.

Certain new crossbred wheats gave most encouraging results. These in particular will be persevered with. In addition to these minor tests semi-field trials were undertaken with several promising Roma crossbreds.



PLATE 92.—MR. C. S. CLYDESDALE, ASSISTANT
INSTRUCTOR IN AGRICULTURE,

Who under the direction of Mr. H. C. Quodling, Director of Agriculture,
has done some notable work in Wheat and Pasture improvement.

Seed Wheat Improvement Scheme for 1926 Season.

Following on a conference between officers of the Department of Agriculture and the Wheat Board, and the acceptance by the Board of the proposals made to extend the cultivation of certain standard varieties of wheat (which include 60 per cent. of departmental varieties), an active campaign was initiated.

In company with the members of the Wheat Board, an itinerary was made of the principal wheat-growing districts, with a view of locating reliable growers to undertake the raising of pure strains of seed, which were to be supplied in the first place by the department at a fixed price per bushel to the growers, on the understanding that, exclusive of the specified quantity which the individual grower was at liberty to retain for his own use, the resultant crop would be purchased by the Wheat Board at a premium of 6d. per bushel over and above the price of No. 1 milling wheat.



PLATE 93.—WHEAT IN THE WEST.

A Crop of "Gluyas" on John Broughton's Farm, Hodgson, immediately adjoining the Mount Abundance Lands.



PLATE 94.—A CROP OF CEDRIC WHEAT (BRED ORIGINALLY ON THE ROMA STATE FARM),

On Messrs. J. W. Aisthorpe's Farm, Bindango, immediately adjoining Mount Abundance Holding, which is in process of resumption for closer settlement.

The scheme was well received by growers, and no difficulty was experienced in placing all the seed which the department had available. Given a satisfactory season, the Board should have several thousand bushels of pure seed available for its seed extension work. As part of the scheme involves the installation of up-to-date cleaning and grading machinery, it is anticipated that a considerable improvement will soon be effected in the purity, type, and quality of the State's seed wheat.

Departmental Wheat Propagation Plots, Season 1926.

Early in the season arrangements were made to carry out a number of tests in nursery rows and to establish field propagation plots where special strains of new and promising varieties could be grown for seed purposes.

In the former case separate plots were laid down at Allora and Southbrook, with eighty Roma crossbreds and a few standard varieties, while in the latter case Cunningham, Southbrook, and Inglewood were chosen as centres for the production of several promising Roma crossbreds.

Light rains were experienced, which permitted of sowing all the wheats, which generally gave a very fair percentage of germination.

Progressive Report on Paspalum Pasture Renovation Experiments.

On 2 acres chosen for this work at Maleny and Cooroy the results, since the establishment of the plots in 1924, go to prove that the rich volcanic soils at Maleny are of high stock-carrying capacity and eminently adapted to dairying, a fact manifested by the heavy yields obtained by cutting and weighing the grass produced on the experiment plots. At Cooroy the soil proved to be less responsive, due largely to its different physical characteristics and to the fact that the subsoil is a rather close-textured clay, which favoured rapid growth only during the warmer months of the year.

At each centre marked differences were to be noted between the quality and yield of the grass from the ploughed and unploughed plots, it being shown unmistakably that where breaking and aeration of the paspalum sod was carried out it proved itself to be the first and most certain method of renovation that could be applied to old, established pastures.









Later on, when the results of the analyses of grass cut from the respective plots are summarised by the Agricultural Chemist, it will be possible to make deductions as to the most suitable fertilisers to use.

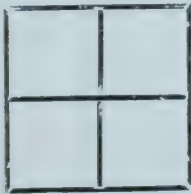
On the ploughed area several months elapsed (two months at Maleny and eight months at Cooroy) before the new growth of paspalum established itself.

RAINFALL.

				COOROY.		MALENY.	
				Wet Days.	Points.	Wet Days.	Points.
1925.							
July ..	..	..	..	1	40	1	40
August ..	..	..	..	9	242	7	606
September ..	..	..	..	3	89	2	63
October ..	..	..	..	5	142	4	183
November ..	..	..	..	14	373	13	786
December ..	..	..	..	11	616	10	685
1926.							
January ..	..	..	..	11	701	11	1,129
February ..	..	..	..	6	185	1	10
March ..	..	..	..	16	404	11	418
April ..	..	..	..	12	425	9	565
May ..	..	..	..	9	558	7	646
June ..	..	..	..	13	549	11	677

SKETCH PLAN AND DETAILS OF MALENY PLOTS.—AREA, 2 ACRES.

Unploughed, 1A to 8A inclusive.		Ploughed, 1 to 8 inclusive.	
8A Basic Super. 1½ cwt. per ac.		Basic Super. 1½ cwt. per ac.	8
7A Nitrate of Soda 1½ cwt. per ac. Nauru peosphate 1 cwt. per ac. Sulphate of potash 1½ cwt. per ac.		Nauru phosphate 1 cwt. per ac. 7 Sulphate of potash 1½ cwt. per ac. Nitrate of soda 1½ cwt. per ac.	
6A Nauru phosphate ¾-cwt. per ac. Superphosphate 3 cwt per ac.		Nauru phosphate ¾-cwt. per ac. 6 Superphosphate ¾-cwt. per ac.	
5A Control. No manure.		Control. No manure.	5
4A Nauru phosphate 1 cwt. per ac.		Nauru phosphate 1 cwt. per ac. 4	
3A Slacked lime ½-ton per ac.		Slacked lime ½-ton per ac.	3
2A Pulverised lime ¾-ton per ac.		Pulverised lime ¾-ton per ac.	2
1A Control. No manure.		Control. No manure	1



Intersections of plots enclosed with wire-netting-covered stock-proof hurdles.

Runcorn Paspalum Pasture Improvement Trials.

In accordance with instructions received, arrangements were made to lay out twenty additional grass experiment plots in conformity with the plan supplied by the Manurial Experiments Committee. Series A and B, consisting of ploughed and unploughed experiment areas, ten plots each, were in this way extended by the addition of series C and D (ten plots each), ploughed and unploughed areas respectively, to which latter fertilisers were supplied.

Arrangements were made in the middle of December, 1925, for the breaking up on series C of the paspalum sod with an English type of mouldboard plough, in furrows 8 in. by $3\frac{1}{2}$ in., the crown of the land being first opened out prior to "ridging."

Subsequent attention was given to the whole of the plots A, B, C, and D in the way of harrowing, mowing with a horse mower (two horses), raking and cleaning up the experimental area.

First cuttings were made later on in the season from the whole of the series for the use of the Agricultural Chemist. Although certain effects were observed through the use of quick-acting fertilisers, which in some instances promoted a fresh green shoot of grass on some of the plots, these latter failed to continue the improvement.

Generally speaking, the results were nullified by the lack of the usual monsoonal rains. Cattle were ultimately introduced to graze down these plots during the off season.

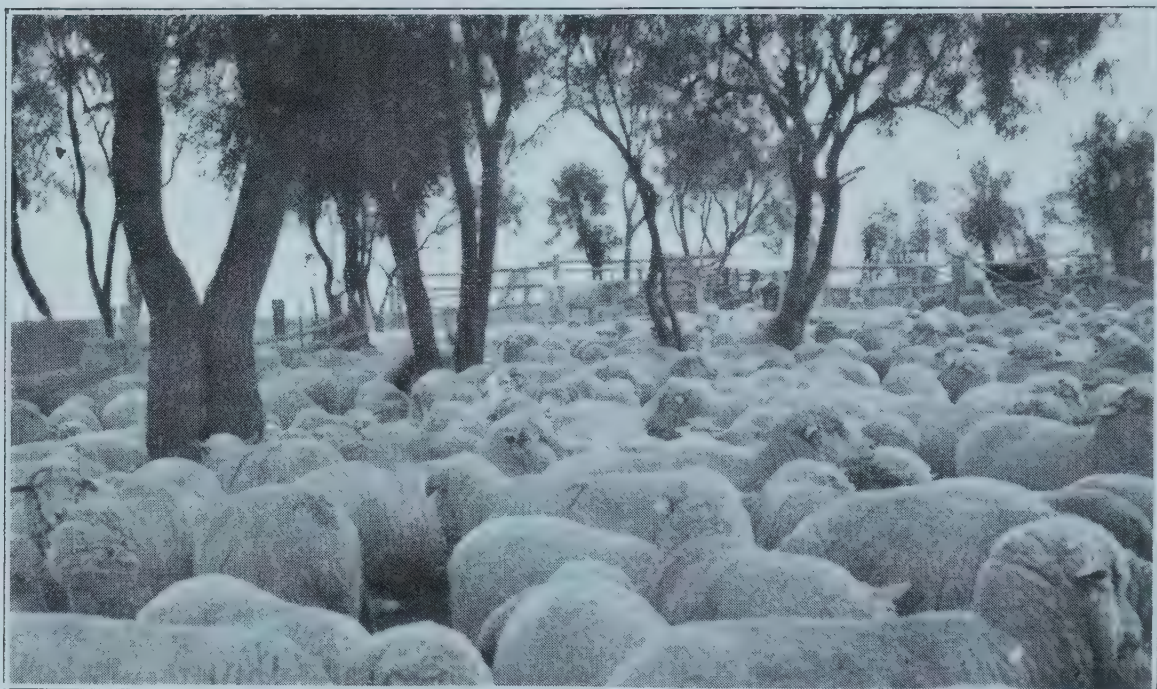


PLATE 95.—WHEAT AND SHEEP IN THE WEST.

A fine mob of ewes, real farmer's sheep, on Mr. J. W. Aisthorpe's property, Bindango, where wheat and wool raising are combined.

Fodder Trials at Runcorn.

At the request of the Manurial Experiments Committee, a small area of land adjoining the paspalum pasture improvement trials was utilised for the purpose of conducting fertiliser experiments with saccaline, maize, Sudan grass, and foxtail millet.

The land was brought into good tilth at the end of December, being ploughed and cross-ploughed and harrowed twice previous to the reception of the seed.

The seed was sown at the following rates:—

- Foxtail millet, 30 lb. per acre;
- Maize, 56 lb. per acre;
- Sudan grass, 20 lb. per acre;
- Saccaline, 30 lb. per acre.

These varieties occupied eight plots, each one-fiftieth of an acre, and were seeded down on 6th January, 1926. The seed and fertilisers were supplied from the Head Office.

The rainfall was as follows:—

January, six wet days, 145 points;
February, three wet days, 18 points;
March, eleven wet days, 297 points.

The more rapid growing plants made use of the moisture to better advantage than those naturally requiring a longer period to mature in.

Striking differences were noticeable between certain of the manured and unmanured plots, reference to which is made in photographic records appearing in the report of the Agricultural Chemist.

In the case of the maize plots the results were influenced by the lack of sufficient moisture and by the depredations of pigeons, which removed a proportion of the seed after sowing.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING SEPTEMBER, 1926 AND 1925, FOR COMPARISON.

				AVERAGE RAINFALL.		TOTAL RAINFALL.						AVERAGE RAINFALL.		TOTAL RAINFALL.	
Divisions and Stations.								Divisions and Stations.							
				Sept.	No. of Years' Re- cords.	Sept., 1926.	Sept., 1925.					Sept.	No. of Years' Re- cords.	Sept., 1926.	Sept., 1925.
<i>North Coast.</i>				In.		In.	In.	<i>South Coast— continued:</i>				In.		In.	In.
Atherton		0·64	25	2·81	0·27	Nambour		2·41	30	7·36	0·30				
Cairns		1·68	44	4·83	0·72	Nanango		1·90	44	2·25	0·87				
Cardwell		1·43	52	11·18	0·82	Rockhampton ...		1·30	39	5·26	1·04				
Cooktown		0·57	50	2·32	0·65	Woodford		2·17	39	3·90	0·37				
Herberton		0·50	39	0·94	0·99										
Ingham		1·29	34	11·08	1·71										
Innisfail		3·55	45	13·15	3·12	<i>Darling Downs.</i>									
Mossman		1·32	13	6·25	1·07	Dalby		1·78	56	1·74	0·53				
Townsville		0·79	55	4·43	1·33	Emu Vale		1·92	30	1·09	0·93				
						Jimbour		1·60	38	1·77	0·21				
<i>Central Coast.</i>						Miles		1·47	41	1·43	0·28				
Ayr		1·48	39	4·66	1·48	Stanthorpe		2·44	53	0·73	0·49				
Bowen		0·81	55	4·30	0·98	Toowoomba		2·22	54	3·11	0·50				
Charters Towers ...		0·76	44	1·96	0·87	Warwick		1·89	61	1·25	0·61				
Mackay		1·59	55	6·23	1·61										
Proserpine		2·10	23	8·01	1·95										
St. Lawrence		1·32	55	0·69	2·12	<i>Maranoa.</i>									
						Roma		1·53	52	1·74	0				
<i>South Coast.</i>															
Biggenden		1·65	27	1·37	0·89										
Bundaberg		1·75	43	0·87	0·57	<i>State Farms, &c.</i>									
Brisbane		2·05	75	2·41	0·42	Bungeworgorai ...		1·25	12	1·38	0·01				
Childers		1·91	31	1·51	0·76	Gatton College ...		1·67	27	1·36	0·26				
Crohamhurst		2·71	30	6·32	0·59	Gindie		1·13	27	1·57	1·51				
Esk		2·23	39	3·13	0·27	Hermitage		1·68	20	1·24	0·78				
Gayndah		1·57	55	1·82	0·89	Kairi		0·60	12	2·63	0·35				
Gympie		2·14	56	3·72	0·53	Sugar Experiment		1·48	29	5·39	1·40				
Caboolture		1·90	39	2·75	0·24	Station, Mackay									
Kilkivan		1·73	47	3·71	0·81	Warren		0·76	12	2·10	1·07				
Maryborough		1·96	54	3·46	0·67										

WEIGHTING THE SILAGE STACK—A PROBABLE SOLUTION OF THE DIFFICULTY.

By A. E. GIBSON, Instructor in Agriculture.

With the advent of warmer weather the dairyman and stockowner who lays claim to foresight in making provision for his live stock or has learnt a lesson from recent drought experiences, will be engaged in the laying down of areas with summer-growing crops that lend themselves to conservation in the form of hay or silage.

A good deal of attention has in the past been drawn to the inexpensive method of converting succulent fodders into silage by means of the stack method, and demonstrations have been given over an extensive area in this State by officers connected with the Field Branch of the Department of Agriculture and Stock.

Although these demonstrations have been widely appreciated, unfortunately, the quantity of silage annually conserved in this manner shows no great increase, and from observations made during visits to farmers, the opinion has been formed that one of the main difficulties in connection with the making of stack silage is the matter of "added weight," which is necessary to eliminate the waste which otherwise occurs.

Speaking broadly, the success of all silage stacks is summed up in the words "sufficient weight added," and it is in this connection that the average silage stack builder "falls down."

The addition of weight to a mass of material which it is desired to convert into silage is necessary in order to bring about consolidation and thereby exclusion of air—practically controlling the temperature at which chemical changes take place. For dairying purposes it is particularly desirable that this temperature should be as low as possible in order to reduce the decomposition of carbohydrates and proteins, which are partially lost or decomposed in the process of fermentation. The subject of a sufficiency of weight, therefore, is one to which attention must be drawn, and, although in the past mechanical presses have been placed on the market, the initial cost of these would go a long way towards providing the cost of a concrete silo which, after all, should be the ultimate goal of every farmer who combines agriculture with stock-keeping.

The most popular methods of applying weight are—

- (a) By the addition of soil.
- (b) By the addition of rock or water-worn stones.
- (c) Timber in the form of logs, &c.

The first method, whilst easy of adoption, and being, of course, close at hand, has its drawbacks. Not the least of these are easy displacement by heavy rains if insufficiently protected; the difficulty of preventing during feeding operations the admixture of soil with at least a portion of the silage; labour involved; and finally soil, by reason of its susceptibility to climatic conditions, cannot be regarded as a stable or constant weight.

Rock or stone, preferably water-worn, lends itself admirably to the purpose of weighting a stack, but unfortunately it is not always available; apart from which the handling of stone is more or less laborious even when a whip or other mechanical means of hoisting are available. The chief advantage of this class of weight is that once obtained it is available without any great amount of transport for further stack building operations.

Weighting by means of logs is a laborious business, and is perhaps the most unsatisfactory, unless such material as fencing posts or sawn firewood blocks are available. Even with these at hand the work is more or less laborious, apart from which weight cannot be concentrated to the same extent as in the case of stone.

The probable suggested solution lies in the direction of cheaply constructed concrete blocks of a size that can be readily hauled, and by reason of their shape lend themselves to close stacking where a concentration of weight is desirable.

Few farmers of to-day are very far distant from supplies of empty petrol tins, and with these, a few bags of cement, a quantity of gravel and sand, a few odd pieces of galvanised wire, plus water and a little energy, a number of cheaply and quickly constructed concrete blocks can be acquired, capable of being easily lifted into position with a simple whip, and practically indestructible. Even when the outside covering of tin rusts away, as it does in the course of a season or two's use, the block itself is sufficiently hard enough to stand rough usage.

The concrete mixture recommended is that known as 4—2—1: *i.e.*, four of gravel or finely broken stone, two of sand, and one of cement. Where economy has to be rigidly adhered to the mixture may be reduced to 5—2½—1, or even 6 to 1 may be used; but for a lasting job the 4—2—1 is preferred.

It is not absolutely necessary that a mixing board should be used if a hard level clayey surface is at hand, but all vegetable matter should be removed therefrom before beginning operations. A few mixings improves this substitute for a mixing board. The petrol tins will require to have their lids removed, which is easily accomplished by means of a sharp tomahawk or old butcher's cleaver; loose edges should be well hammered down. At the same time remove by hammering any dents in the tins which would prevent the concrete settling well into the sides, as an irregular-shaped mould naturally means a similar shaped block, which will for ever give trouble when it comes to stacking.

The pieces of galvanised wire should be bent to form loops large enough to slip a trace hook into, and should be hung across the middle of the top of the tin by a piece of round iron during the process of filling the tin with concrete. Twist the spare ends in any irregular shape calculated to hold in the concrete. Well ram the concrete till it comes to the level of the top of the tins. Sufficient shrinkage will take place during drying to leave exposed the loop of galvanised wire, but before the concrete is thoroughly set it is as well to make a slight indentation around and between the loop to admit of rapid hooking and unhooking during hoisting operations.

The blocks, when set, should be allowed to dry out slowly and should be kept moist either by wet bags or sand for at least a week; afterwards being allowed to "cure" slowly, preferably in some form of shade from the direct rays of the sun.

For those who contemplate constructing the blocks as set out, the following information may be useful:—Approximately 37 petrol tins will hold 1 yard of concrete, and a strength of 4—2—1 will require per cubic yard of concrete $4\frac{1}{2}$ bags of cement, $\frac{9}{10}$ cubic yard of finely broken stone or gravel, and $\frac{1}{2}$ yard, nearly, of sharp sand free from soil. One yard of concrete weighs approximately 4,050 lb. Approximate weight per block, 109 lb.

FIELD DAY AT THE ROMA STATE FARM.

A PROMISING NEW WHEAT.

About sixty farmers and other visitors took advantage of the recent annual field day to visit the Roma State Farm. The visitors were cordially welcomed by the manager (Mr. R. E. Soutter) who conducted them around the experimental wheat plots. Adjoining these, the visitors noticed an area of wheat considerably more advanced toward maturity than any of the other plots. This was a comparatively new variety—"Watchman"—a cross between Soutter's Early and Warren. This variety is also being grown in a small way by one or two farmers in the Maranoa, who report favourably on its behaviour under the very dry conditions prevailing this season. From experience to date, "Watchman" is likely to prove a valuable addition to the wheat suitable to the Maranoa district. Rows of experimental wheats, including about 120 varieties, were inspected, and Mr. Soutter briefly explained the history, characteristics, and suitability or otherwise of these to the Maranoa soil or climate, so far as experiments to date had proved.

Other plots where the value of fertilisers is being tested were inspected, and the manager stated that the yield from an area which had been fertilised compared with an adjoining one which had not, was, over a number of years, 21 bushels to 18 bushels per acre respectively. The additional yield from the manured plot, he said, more than paid for the extra cost of fertilising, and where sheep were on the farm (a combination which is rapidly growing in favour throughout the Maranoa) there was an added advantage from better pasture subsequently.

Mr. Soutter gave an interesting demonstration of crossing wheats, and the visitors then inspected the grape vines and fruit trees, noting with much interest the methods of pruning, training, and grafting. Training of the growth of peach trees along wires, somewhat on the same principle as grape vines, was a novelty to many, and created much interest.

Following afternoon tea, the visitors were shown the farm's method of grading wheats, and the manager then, by means of a number of small phials containing cow peas and wheat, attached to a screen, gave an instructive little demonstration of the results of the crossing of distinct varieties of each. In simple language Mr. Soutter pointed out how the dominant characteristics in the crossed plants prevailed, and how a definite conclusion as to the ultimate product was reached. Mr. Soutter had also something to say about the olive trees planted eighteen years ago, which form an excellent avenue leading to the manager's residence.

Before the gathering dispersed, Councillor J. S. Murphy (chairman of the Bungil Shire Council) expressed the thanks of the visitors to Mrs. Soutter and her lady friends for a very welcome cup of tea, and to the genial manager for a very instructive tour of the State Farm. He paid a well-deserved tribute to the splendid experimental work being carried on by Mr. Soutter, remarking that while its value was already recognised by many, it would be much more highly appreciated in the years to come.

Mr. Soutter, in replying, said he hoped that the field day would be made an annual event. In answer to a question, he mentioned several varieties of wheat which he considered to be among the most suitable for the Maranoa, including Amby, Gluyas, Florence, Bunge, Cedric, Warren, and Watchman. He added, however, that a great deal depended upon location, the nature of the soil, and methods of cultivation. He advised any farmer who had growing on his place a wheat which suited his land to stick to that variety.

The field day was greatly appreciated by district farmers as being something much more than a very enjoyable social event, and the practical work carried out by Mr. Soutter on the Roma State Farm was warmly commended.

IRRIGATION IN THE WEST.

By J. DAVIES, Inspector of Dairies.

What can be done by irrigation on a Western farm has been well demonstrated by Messrs. Page Brothers, of Miles. They took up a selection there about two years ago. The timber comprised apple, ironbark, and cypress pine. After felling the timber and milling it themselves, they erected a substantial homestead. In the meanwhile, they cultivated a small area as a market garden, and together with dairying, this acted as a means of keeping the pot boiling. The cultivation has been extended to about 6 acres irrigated from a spring lagoon. This lagoon had, at the time of writing, some 18 feet of spring water; in good seasons it has a depth of 25 feet, and covers about 3 acres. Irrigation is carried out by the engine which was used for the milling of the timber, together with some 400 feet of piping, to which are attached eleven sprinklers. These sprinklers were made on the farm, and each has a radius of 18 feet and they do their work well. The piping can be taken up without very heavy lifting and placed at will in any part of the garden. Messrs. Page Brothers are believers in fertilising as well as irrigation, and the abundance of the crops fully shows what can be done, though it is in what is considered more or less a dry belt. The soil is a fine sandy loam, and is ploughed to a depth of 1 foot. The local market is good, and last summer they were unable to keep up with the demand, which extended as far as Charleville.



Photo.: J. Davies.]

PLATE 96.—A WESTERN CABBAGE GARDEN—WATERED WITH A SMALL BUT EFFECTIVE SPRINKLING PLANT.

New Cultivation on Messrs. Page Brothers' Farm at Miles.



Photo.: J. Davies.]

PLATE 97.—“SPLASHES OF THE NEEDFUL.”
Sprinklers on Messrs. Page Brothers' Farm at Miles.

DISTENDED ABDOMEN IN POULTRY.

By P. RUMBALL, Instructor in Poultry Raising.

Hens with distended abdomens are not an uncommon feature in many poultry yards, and when such hens are noticed the cause should be ascertained, as this condition generally is not indicative of high production.

There are several causes of distended abdomen, and they may be grouped under two headings—viz., (1) Physical conditions and (2) diseased conditions.

Physical Conditions of Enlargement.

Under physical conditions may be classed birds which are carrying an excessive quantity of internal fat. This fat is situated in a layer around the bowl or soft portion of the abdomen, frequently being an inch or more in thickness. Birds in this condition also have much fat upon the intestines and connective tissue, and



PLATE 98 (Fig. 1).—SHOWING THE OVIDUCT OF A BLACK ORPINGTON HEN FILLED WITH PARTIALLY FORMED EGGS.

Stoppage of the organ in the first instance was due to the irritation caused by the breaking of an egg, possibly the result of a knock following a fright.

this together with the thick layer referred to causes that swollen or distended appearance. This condition can easily be ascertained upon handling. The bird will be exceptionally heavy and the thickened wall of the abdomen can be felt.

Another class of bird which comes under the heading of physical conditions is the bird in which there has been partial rupture of the membranes which hold the intestines in position. This ruptured condition allows the intestines to rest upon the soft portion of the abdomen, giving it that distended appearance. This condition is termed "down behind," and is easily ascertained by handling, the abdomen being soft and yielding, and by gentle pressure with the forefinger upon one side and the thumb upon the other the intestines can be felt.

This condition is more frequently met with in birds which are very short in the breast-bone and occasionally in excessively fat birds. The dragging and constant brushing with the legs against the abdomen often causes the formation of small abscesses, but apart from that the constant irritation is sufficient to retard production. The evil of the short breast-boned bird has probably been accentuated by breeders selecting birds which show great length or distance between the end of the pelvic bones and end of the breast-bone in their search for capacity, forgetting that in measuring the distance or depth of a bird on these lines, the angle at which the measurement is taken upon a short breast-boned bird is greater than one with a relatively long breast, while the true depth may be the same. While the internal organs are held in position by membranes, and are not naturally dependent upon the framework of the body for support, in cases of fright, particularly when the hen is in full lay, the framework does act in this direction.

There is yet another class of bird which could be treated with under physical conditions, and that is one in which there has been a rupture or derangement of the reproductive organs. There are two principal forms of this trouble, one as



PLATE 99 (Fig. 2).—CYSTIC FORMATION NEAR THE CLOACA.

Can be removed by operating. In doing so, sever the attaching cord about midway between the cyst and seat of attachment.

illustrated in Figs. 1 and 2, cases where a distinct rupture occurs in the oviduct, allowing the individual egg to fall through into the abdomen. The condition of the oviduct as illustrated in Fig. 1 is undoubtedly due to an egg becoming broken in the lower portion of the oviduct. This broken egg, by causing local inflammation, has prevented the eggs which followed from being laid, with the consequent packing up as illustrated. This condition, as will be noted from the illustration, took some considerable time to form and externally the bird showed no signs of distress, looking all that a good layer should, the swelling of the abdomen being the only optical indication of possible trouble. If an examination had not been made the bird would not have been culled out, the oviduct becoming still more enlarged, possibly rupturing and allowing the mass of egg matter to fall into the abdominal cavity. Examination with the fingers would indicate, when gentle pressure was exerted, a hardened mass, enabling the poultry keeper to eliminate still another unprofitable bird.

Enlargement Due to Diseased Conditions.

There are two primary diseased conditions responsible for the enlargement of the abdomen—namely, abdominal dropsy and cystic diseases. With either of these troubles the hens affected will generally stand more erect than normally and in advanced stages will be nearly as upright as a runner duck. They become disinclined to move about and when action is forced on them the comb becomes more or less darkened in colour and they experience difficulty in breathing, due to the pressure of fluid or cysts on the air sacs. In both cases the abdomen becomes very much enlarged and feels like a bladder of fluid. When pressed gently in one place there will be greater undulation in another, indicative of the presence of fluid. Judging by the abdomen alone it is difficult to distinguish dropsy from cystic trouble, but the breeder may be guided to a large extent by the condition of the bird. With abdominal dropsy the bird generally becomes thin and emaciated, while the bird with cystic trouble is generally in good condition, particularly if the cyst is not of long duration. Dropsy is due to chronic inflammation of the liver or peritoneum and the carcass is unfit for consumption. It is more frequent in old birds, particularly those that have been heavy layers, and in many cases it may be associated with internal tumours.

Cystic troubles are not infrequent in poultry. For every case of fluid due to dropsy coming under the notice of the writer there have been twenty or more due to cystic troubles. The seat of the cysts commonly met are in two distinct positions—namely, on the ovary and near the upper portion of the cloaca.

Cysts on the ovary vary considerably in formation. In some cases ovaries have been noticed in a general cystic condition, the cysts varying in size from a pea to that of an exceptionally large egg, and in other there has been but one large cyst similar to that illustrated in Fig. 2. Ovarian cysts are probably due to the degeneration of certain cells, and it is probable that the forcing and stimulating foods given to poultry assist in the development of this class of cyst. Poultry keepers, however, need not be alarmed when one or two birds are found affected in their flocks, as no case of general infection are known.

Fig. 2 shows a cystic formation situated near the upper portion of the cloaca. This is the seat of the majority of cysts coming under the writer's notice. They attain enormous dimensions, the one illustrated holding a little more than one and a-half pints of fluid.

Birds can be operated on for the removal of cysts, but the low value of the individual hen hardly warrants the labour involved. Breeders, however, who desire to remove cysts should take action before the cyst becomes too large, as when it is in this condition it is difficult to make an incision in the walls of the abdomen without puncturing the cyst. To operate make an incision about 2 inches in length on the side of the bird, where the wall of the abdomen is thin. An effort can then be made to get a small portion of the cyst out. This now forms a neck in the cyst and by slight pressure upon the abdomen some of the fluid can be forced into that portion of the cyst outside, then more of the cyst withdrawn, and the process repeated until the whole of the cyst is removed from the abdominal cavity. The attachment between the cyst and the body can then be severed, the wound sown up, and the operation is then completed. It will, however, be understood that all of this work should be performed under conditions to prevent the poisoning of the wound. Operations have been performed upon birds with cystic troubles and their laying has not been interfered with, but in these cases the cyst was caught in the early stage. If it had been left to develop, it would have of its own accord stopped the bird from laying.

FATTENING POULTRY.

By P. RUMBALL, Instructor in Poultry Raising.

In dealing with this subject there are two distinct classes of birds to receive consideration—namely, young growing cockerels and culled or old hens. Owing to the constant development of the bony structure and muscular development of cockerels there is a necessity for a slight variation in the ration used, but there are, however, similar conditions for the method of feeding, housing, and general treatment.

General Health.

Both cockerels and hens intended for fattening should possess good health and be free from both internal and external parasites. It is uneconomical to try and

fatten birds which do not possess these qualifications, and, therefore, sickly birds and birds not possessing constitution should be destroyed and wormy stock treated for worms before commencing operations.

Period of Fattening.

When birds are placed under conditions most suitable for fattening—that is, more or less confined conditions—exercise is restricted with the result that in time it is impossible to induce the birds to eat sufficient quantities necessary for further development, and therefore the maximum period recommended for special fattening is fourteen days.

Methods of Feeding.

Pen Feeding of Young Cockerels.—When cockerels are about eight weeks old they should be separated from the pullets, graded according to size, and placed in pens. The pens should be small to restrict exercise and provided with sleeping quarters and ample shade.

The following ration will be found to give satisfactory results:—20 lb. bran, 20 lb. pollard, 40 lb. maize meal, 10 lb. oaten pollard, 5 lb. bone meal, 5 lb. meat meal, and $\frac{1}{2}$ lb. salt. This mash should be moistened with milk and fed two or three times a day, but it is essential to maintain the appetite of the birds and only quantities that would be consumed, say in half an hour, should be fed at a time.

Grain is not essential, but if it is desired to feed only two mashes per day, small quantities of a grain mixture of 2 parts maize and 1 part wheat may be fed. Green feed is not necessary in any quantities, but small amounts might be used to assist in maintaining appetite and health.

If it is desired to produce larger cockerels for marketing purposes, pen them under similar conditions to those above when twelve to fourteen weeks old, but separate them from the growing pullets early in life and feed them on growing foods until fattening operations are commenced.

In pen feeding culled or old hens cracked maize can be fed both morning and night with two mashes during the day. The mash should consist of 50 per cent. maize meal, 20 per cent. bran, 25 per cent. pollard, and 5 per cent. meat meal. This mash should be moistened with milk if available.

When available the drink supplied to pen-fattened birds should be sour skim milk or butter milk, and when so, no other drink is required. Plentiful supplies of hard grit and charcoal should always be available.

Crate Fattening.

It is only desirable to resort to this method of fattening when adult birds or well-grown cockerels are to be treated, and then only for assured markets. This method needs more attention and adds to the work of the farm, hence the necessity of obtaining returns commensurate with the cost of labour and material used. A crate 2 feet long, 18 inches deep, and 18 inches high is simple of construction. This crate will hold three to four birds according to their size. A long crate of similar dimensions could be built, divided into 2-foot sections, and raised on legs to facilitate the work. It will be understood that under such conditions the sanitation of the crate must receive strict attention; dirty crates soon lead to sickness and poor results. A V-shaped trough placed in the front for the purpose of holding the porridge or gruel form of food given, together with receptacles for grit and charcoal, is all that is needed in the way of furnishings.

Under this system it will be found that hens will obtain the maximum results in six to seven days, cockerels seven to ten, and capons ten to fourteen. Birds kept under these conditions for a longer period soon go off. The food should be mixed into a paste with skim milk or buttermilk, having a consistence that will permit of it running fairly freely from the receptacles. This can be made of 2 parts maize meal and 1 part of pollard or wheat meal and a little bran. Small quantities should be fed until the birds become accustomed to the altered condition of feeding, then increasing the amount until the birds have had all they will consume in half an hour. Three feeds should be given daily. No other food or drink is necessary.

In all methods of fattening it is important to keep the birds as quiet as possible, having rooms or sheds well ventilated but free from draughts and sunlight. All coops, sheds, &c., must be kept clean and be frequently disinfected, internal and external parasites guarded against, and any bird sickening under the process given its liberty. Supplies of grit, both hard and charcoal, should always be available.

COTTON IMPROVEMENT LAWS IN CALIFORNIA.*

By O. F. COOK, Bureau of Plant Industry, U.S.A.

Conditions are favourable for cotton in the irrigated valleys of California and Arizona, including the better qualities of fibre. In view of the higher costs of production, it has not appeared that a cotton industry could be maintained on a basis of direct competition with the eastern Cotton Belt in raising ordinary short staples. The Pima variety of Egyptian cotton is grown in Arizona, while most of the cotton in California is of an Upland variety called Acala, introduced from Southern Mexico.

The growing of short staple Upland cottons has been profitable in California in seasons of high prices, but the need of producing uniform, high quality fibre has been recognised by the growers, in order to stabilise the market relations. The reasons for standardising the production of cotton are the same that have been recognised with other crops in California, and similar methods are being followed, through co-operative organisations of the growers.

The production of miscellaneous, mongrelised cotton is wasteful, and the commercial classification of the bales is a difficult and costly operation, with results that do not satisfy either the farmer or the manufacturer. Many of the commercial difficulties are reduced or avoided through standardised production, so that all of the bales contain the same kind of cotton. The sampling, grading, and stapling of the individual bales may prove unnecessary in districts where production is standardised.

Cotton is grown as an annual crop, and production can be standardised only by establishing and maintaining adequate supplies of pure seed, which is possible only in communities that restrict themselves to one variety.

The Coachella Valley in Riverside County was the first community to adopt the Acala cotton in 1920. The seed-stocks were maintained in isolated districts, and other varieties gradually eliminated. The same course is being followed in several other valleys. The advantages of standardised production of cotton are clearly understood and the stage of legal recognition and protection of such communities has been reached. The Legislature of California recently has enacted two laws in behalf of the cotton industry, one to stabilise the pure seed districts, where only a single variety of cotton may be grown, and another providing for the certification of pure cotton seed by the California Department of Agriculture.

The Acala variety is a superior type of Upland cotton, discovered in 1906 in Southern Mexico by the U.S. Department of Agriculture, acclimatised in Texas, and grown on a large scale in Texas and Oklahoma, to the extent of the supplies. It is an early, productive variety, with large "storm-proof" bolls, well adapted for easy and clean picking. A bale per acre is considered as a normal yield in California and two-bale yields are not infrequent in some of the irrigated valleys. The fibre is abundant and of excellent quality, with a length of one and one-eighth or one and one-sixteenth inches under favourable conditions, and generally commands a premium over the shorter staples. In addition to uniformity, strength, and good spinning qualities, a special characteristic is reported from England and France, in taking dyes better than most cottons of the same staple.

The following statement regarding the community law is from the Official Record of the U.S. Department of Agriculture for 5th August, 1925. Also the text of the law will be of interest to cotton breeders and to those who are concerned with the problem of pure seed supplies.

LEGAL PROTECTION OF COTTON COMMUNITIES IN CALIFORNIA.

That the farmers of each community restrict themselves to the planting of a single variety has been urged by the Department of Agriculture as an essential step in the progress of the American cotton industry. The advantages in community production are now so well recognised in California that legal protection is being given to the one-variety communities against the danger of mixture and impairment of the seed-stocks by careless or irresponsible individuals.

In two of the California cotton-growing counties, Riverside and Kern, ordinances were passed by the boards of supervisors to keep other kinds of cotton seed from being planted in the one-variety communities. At the last meeting of the State Legislature an Act was passed which definitely excludes other varieties

*Reprinted from "Journal of Heredity," XVI., No. 9.

of cotton from specified districts where the farmers have restricted themselves to the Acala variety.

The purpose of the enactment to protect the public interest in the improvement of the cotton industry is clearly stated in the first section of the Act (California Assembly Bill No. 167), and is regarded by the farmers of the Act as in line with well-established precedents. It is recognised in other public improvements that the responsibilities are to be shared by the entire community that establishes the improvement, as in irrigation or drainage districts. No extra cost is involved in establishing the one-variety improvement, but only the requirement that growers refrain from injuring their neighbours who have adopted an improved system of production. The cotton land becomes more valuable in a restricted community because it can be used with greater advantage to the farmer, as in parts of California where a definite exclusion of noxious weeds or diseases is being maintained.

As compared with the usual conditions of mixed-variety production each individual farmer of a one-variety community is able to raise more cotton and cotton of better quality, which can be sold at a higher price. The manufacturers are willing to pay more for dependable supplies of uniform fibre because the spinning and weaving are less expensive and the resulting fabrics are better. The advantages to be expected eventually through establishing and maintaining a system of community production and marketing of the crop of Acala cotton in the single-variety communities may be estimated conservatively at from 3 to 10 cents. per lb., or from 15 dollars to 50 dollars per bale, more than the growers would receive if other varieties were admitted and the usual mixing and mongrelising of the seed stocks took place.

Under the usual conditions of production, with different varieties grown in neighbouring fields and the seed mixed together at the public gins, most of the crop is produced from mongrelised, "gin-run" seed and the lint is of irregular, inferior quality. On account of cross-pollination by insects and the construction of the gin machinery the mixing and deterioration of seed stocks is practically inevitable if different varieties are grown in the same community. No general utilisation of superior varieties is practicable without the one-variety communities where the pure planting seed can be produced in sufficient quantities to maintain the quality of the cotton throughout that region.

The protection of one-variety communities is of interest in other States not only as a step in working out the general problems of the cotton industry, but as assuring a source of seed supply of good varieties that may be drawn upon in emergency years. Twice in the last ten years most of the good stocks of planting seed have been lost over wide regions of the eastern Cotton Belt, as a result of unfavourable weather and excessive weevil damage, so that most of the crop of the following years had to be planted with inferior seed, for lack of any supply of good seed in sufficient quantity.

TEXT OF ONE-VARIETY LAW.

An Act to provide for the growing of one variety or species of cotton, to wit, Acala, in certain prescribed and defined districts in the State of California; to prohibit the picking or harvesting of any variety or species of cotton other than that known as Acala in such districts; to prohibit the possession within such districts for the purpose of planting any seeds or plants of any variety or species of cotton other than that known as Acala in such districts; to prohibit the ginning of any variety or species of cotton other than that known as Acala in such districts; defining such districts; and fixing the penalty for a violation of this Act.

The people of the State of California do enact as follows:—

Section 1. The Legislature hereby declares that the purposes of this Act are to promote, encourage, aid, and protect the planting and growing of cotton in the State of California; that it believes this purpose best can be accomplished by restricting within certain areas hereafter defined the planting and growing of but one variety or species of cotton, to wit: Acala; that by this means alone is it possible to bring the cotton-growing industry in the State to its highest possible development and to insure the growing of the most superior and economically most profitable variety or species of cotton; that the planting of pure seed is essential to the production of a more merchantable and better grade of cotton and cotton seed and for the production of a grade of fibre best suited for manufacturing purposes; that the planting of impure seed or plants other than that permitted in the areas hereinafter defined is an economical harm and loss to the planter thereof and an irreparable injury to the adjoining or neighbouring growers; that

the restriction of the use to which cotton lands may be used, as provided in this Act, is essential to the highest development of the cotton-growing industry and of benefit even to one who would violate the provisions of this Act; that it is essential that but one variety of cotton should be ginned in the district in this Act defined, otherwise the gin will mix the different kinds of seed, crossing takes place in the fields, the varieties are mongrelised, and cease to be uniform, the fibre deteriorates in quality, and the seed rendered unfit for planting; that solely by restricting the growing of one variety or species of cotton in certain areas can the fibre be grown of uniform length and quality, and the highest price paid for the cotton thus obtained, and the production of fibre of different lengths or grades be prevented; that fibres of different lengths and grades are commercially inferior and when assembled in one lot or grade are classed and given the value of the lowest grade in the lot or sample; that Acala cotton is now the variety or species of cotton that has been most highly developed and improved and most suited commercially for growing in the districts in this Act defined; that if future experiments should develop an improved variety or species of cotton, this Bill can be amended to designate it; and that the districts in this Act defined can be altered, restricted, or extended.

Section 2. This Act shall be so interpreted and construed as not to be considered the taking of private property without due process of law; nor disturbing the owner in the control or use of his land for lawful purposes; nor restricting his right to dispose thereof, but as a declaration by the Legislature that its use for the purposes herein forbidden is prejudicial to the public interests and an economical loss to the State and an irreparable loss and injury to the cotton growers.

Section 3. In the districts in this Act defined, it shall be unlawful to plant any seeds or plants of any variety or species of cotton other than the seeds or plants of that variety or species known as Acala.

Section 4. It shall be unlawful in the districts in this Act defined to pick or harvest cotton of any variety or species other than that known as Acala.

Section 5. It shall be unlawful for any person, individual, co-partnership, association, firm or corporation, or agent or employee thereof, to have in his or its possession within the districts in this Act defined for the purpose of planting any seeds or plants of any variety or species of cotton other than that known as Acala.

Section 6. It shall be unlawful for any gin located or operating in any one of the districts in this Act defined to gin any variety or species of cotton other than that known as Acala.

Section 7. District number one shall consist of the county of Riverside; district number two shall consist of the county of Kern; district number three shall consist of the county of Madera; district number four shall consist of the county of Fresno; district number five shall consist of the county of Kings; district number six shall consist of the county of Tulare; district number seven shall consist of the county of Merced; district number eight shall consist of the county of Stanislaus; district number nine shall consist of the county of San Joaquin.

Section 8. Any person, individual, co-partnership, association, firm, corporation, agent, or employee who or which shall violate any of the provisions of this Act shall be deemed guilty of a misdemeanour, and, in addition thereto, shall be liable in a civil action for all damages that may be occasioned or caused by a violation of this Act.

Section 9. If any clause, sentence, paragraph, or part of this Act shall, for any reason, be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair, or invalidate the remainder thereof, but shall be confined in its operation to the clause, sentence, paragraph, or part thereof directly involved in the controversy in which such judgment shall have been rendered. The Legislature hereby declares that it would have passed this Act irrespective of the fact that any clause, sentence, paragraph, or part thereof be declared unconstitutional.

Section 10. That this Act shall not apply to the planting or growing of cotton in the experimental stations or farms conducted by the United States Government; the State of California; nor to the transportation of seed or plants by interstate or intrastate commerce, nor to seed in transit from a point without one of the districts in this Act defined to a destination without such district; nor to the transportation of plants or seeds into one of the districts hereinafter defined for experimental or technical purposes by the United States Department of Agriculture, the Department of Agriculture of the State of California.

Section 11. All Acts and parts of Acts in conflict herewith are hereby repealed.

THE POLAND-CHINA PIG.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Of the several breeds of pigs originated and developed under American conditions and including breeds suited for the production both of the very heavy lard hog—for which, in America, there is a continuous demand—for bacon production both for home consumption and for export, and pork, we have in Australia but two representative breeds—viz., the Poland-China and the Duroc-Jersey, the red hog, to which extended reference is made in the pamphlet now available, dealing with the Duroc-Jersey, the most recently introduced of these two American types.

The Modern Poland-China.

It would be as well, possibly, in describing this one of America's leading types of pigs, to state quite distinctly that the reference is to the more recently introduced modern type of Poland-China and not to those old spotted types one sees occasionally in different districts here in Queensland and on the Northern Rivers of New South Wales. These older types are now out of date in so far as their usefulness for the purposes of stud breeding is concerned; they are also invariably coarser and less profitable than the types described and illustrated herein (see Figs. 1-6), whilst it is impossible in most instances to trace their breeding or to record their pedigrees. On the other hand, the modern type of Poland-China is up to date in this, as in every other respect.

It would not be correct, in view of the above statement, to classify our Poland-Chinas as belonging to two special groups or types, such as might be referred to as old type Poland-Chinas and improved or modern Poland-Chinas, though it is correct to state that the Poland-Chinas referred to in this article as modern or improved in type are a decided improvement on the types of fifty years ago, and it is anticipated now that they will become much more popular as time goes on and breeders generally learn to appreciate their special and valuable qualities more than they have done in the past. It is necessary, too, that special care should be taken to guard against unfavourable features of the breed, for the breed is inclined to fatten very readily, and unless carefully handled, to become far too fat for our market requirements.

How the Poland-China Originated.

Apart from the several breeds of pigs originating in the British Isles from the old English wild pig crossed onto the Chinese and Neapolitan types, there are numerous other breeds and types in various parts of the world, some of which are specially worthy of note; many of these have been evolved under American conditions, the American types possibly now being more widely known than the types of any other country, with the single exception of the British Isles. Prominent among the American types is the Poland-China, which originated in the Miami Valley, Ohio State, in the counties of Butler, Hamilton, and Warren.

While the improvement of various types of animals was taking place in Great Britain, our "Yankee" brethren looked on, took notes, and eventually decided to attempt improvement of the wild razor-back type of which America and Canada, in those days, apparently had an unlimited supply. As far back as 1816, there is record of the attempt to improve the old Byfield and Russian hogs by crossing them with an imported type then known as the "Big China," a breed specially introduced for the purpose by one John Wallace, a leader of a sect of people known as "The Shakers." These "Big China" pigs were white in colour, and were noted for fine quality of flesh and for their comparatively quick growth.

Later, and in the year 1834, an Irish type of pig—known as the "Irish Grazier"—resembling the Old English Berkshire, was introduced into Ohio State, and the progeny of these pigs, when mated with the native hog, were so favourably commented on that the Berkshire type, as it was then, was, as opportunity offered, freely introduced and used liberally for crossing on the partly improved stock available.

During the period 1816 to 1845, several other breeds and types of hogs were brought into South and Western Ohio and were used in the building up of the breed, including the Irish Grazier, a medium-sized white hog with ears erect and with characteristics of smoothness and early maturity, and the Siamese, a small black hog of very early maturity. The Berkshires, introduced about 1839, were very



PLATE 100 (Fig. 1).—A PAIR OF POLAND-CHINA CHAMPIONS.

This photograph also illustrates the modern type of Poland-China as they appear when polished up and in Show condition. These two sows



PLATE 101 (Fig. 2).—A CHAMPION PRIZE-WINNING POLAND-CHINA SOW "DANESBORO JUDY 131."

Bred by Mr. Trevor Brown, of Narellan, New South Wales. Note her great quality and evenness of type, up-to-date in every respect.

large hogs "of even top and bottom lines, with good feet, not much depth of body, and drooping ears." These old Berkshires were red or sandy coloured, and were known in Ohio as Berkshires because their ancestors came from that part of England. There has been, until quite recently, a fairly popular "red" Berkshire in America.

Other so-called breeds mentioned as having been used to a greater or lesser extent in the making up of Poland-Chinas were the Bedfords, or Woburns, the Byfields, Neapolitans, Russians, and others. These were not well-defined breeds such as exist to-day; the names given to them were merely terms used to designate certain kinds of pigs with more or less variation in type.

It is claimed by the Poland-China Breed Promotion Committee of U.S.A. that the world's first real "corn belt" of commercial importance was in that region of South-Western Ohio known as the Miami Valley, in which one of the principal problems presented to farmers of that section was the production of a hog that would best convert the abundant corn crops into pork and carry it to market. It is not likely that the men who assisted in the development of this breed had in mind a definite type of animal as the final result of their breeding operations; it was the corn belt and the corn-belt environment alone that determined the ultimate type. No one type or breed used in the moulding of Poland-Chinas exerted a predominating influence, but about 1850, when the process was considered complete, the result was a hog such as had never existed in the corn belt before. This hog was the product of the corn belt and of the constructive efforts and commanding genius of the farmers of that community. The claim has been made by those familiar with what took place that no new blood (*i.e.*, blood of other than the Poland-China breed) was introduced into the breed after 1845. By that time it had come to be well recognised as a breed, although it was known for some time by several different names, such as the Warren County hog, the Miami Valley hog, the Magie hog, and others.

The name "Poland-China" was officially adopted in 1872 at a convention of hogmen held in Indianaapolis for the purpose of naming the breed. The word "Poland" is generally thought to be a misnomer. Some of the hogs that were used in the making up of the breed were known as Poland hogs. This led to the belief that they were descended from hogs imported from Poland. The facts of the case, as stated by the Poland-China Breed Promotion Committee, are that one of the most successful and outstanding hogmen of the period around the year 1840 was Ascher Ascher, a Polander by birth, who lived in Butler County, Ohio. He brought no hogs to that locality, but was able to produce a superior class of hog from the material at hand, and sold a great many boars. His pigs were known as Poland hogs, and this forms a part of the breed's present name. Until 1870 the breed was largely described as dark spotted; soon after the fashion or fancy changed, and in a few years the breed was to a very large extent black with white points, and this is the prevailing preference to this time. No hard and fast rule is enforced as to the white points, and few breeders will discard a good animal because it has a little extra white on it. The first Poland-China record was established in 1877; within three years two others were started, and later the breed had six records. These have been reduced to three at the present time. Joint action of these three records for united breed promotion started in 1920, and is the most hopeful promise of the breed's future welfare. In Australia, Poland-Chinas are catered for, in so far as herd book registration is concerned, by the Australian Stud Pig Breeders' Society, in whose herd books quite a large number of Polands have been registered. This society, which is controlled by a Federal General Council, has branch committees in each of the several States of the Commonwealth, so that Poland-China breeders desirous of registering their stock should get in touch with the local secretary in order to obtain full details.

In America an attempt was made some years ago (and with considerable success) by a number of breeders to retain the qualities of the original type under the name of the Spotted Poland-China, and since then this type has been developed to such an extent as to be quite distinct from the Poland-China proper; but these Spotted Polands have never attained the same popularity, nor have they been distributed to the same extent, as the Poland-China proper. Even of the last-mentioned type, in America, there are two separate classes—one the big-boned, growthy, lard type; the other the medium bacon or pork type, similar in colour and shape but distinct in size and development of bone. The types common in Australia are of this latter medium bacon and pork class; the former type has not yet been introduced.

As we have them now it is proved that success can be attained only by allowing them to have considerable range and by forcing them to take exercise freely every day. They should be given a variety of foods, not too liberal in quantity but of good quality. They have comparatively small appetites and have wonderful powers

of assimilation, but unless they are judiciously handled and compelled to take exercise freely in these warm climates, they become sluggish and excessively fat. They must be allowed ample shade and fresh cold water, as they cannot stand continuous dry heat. They likewise require protection from the cold winds of winter, and should be given adequate accommodation at all times.

Special care should be exercised to have the animals in proper condition at mating and at farrowing time—they must be in medium condition only, not too fat nor too thin and worn. They must at all times be carefully bred and fed, and it is wise to introduce fresh blood occasionally, as the type is inclined to deteriorate unless properly attended to. Special care should likewise be paid to the selection of breeding stock from large, thrifty, sturdy litters, correctly marked and shaped and of proved vigour.

Poland-Chinas were first introduced into Australia about forty years ago by one William Marks, but records showing from where the type came appear to have been lost. One of the early breeders, and one who still handles this breed, is Mr. G. H. Gray, of Federal, Richmond River, N.S.W. Writing concerning his experi-

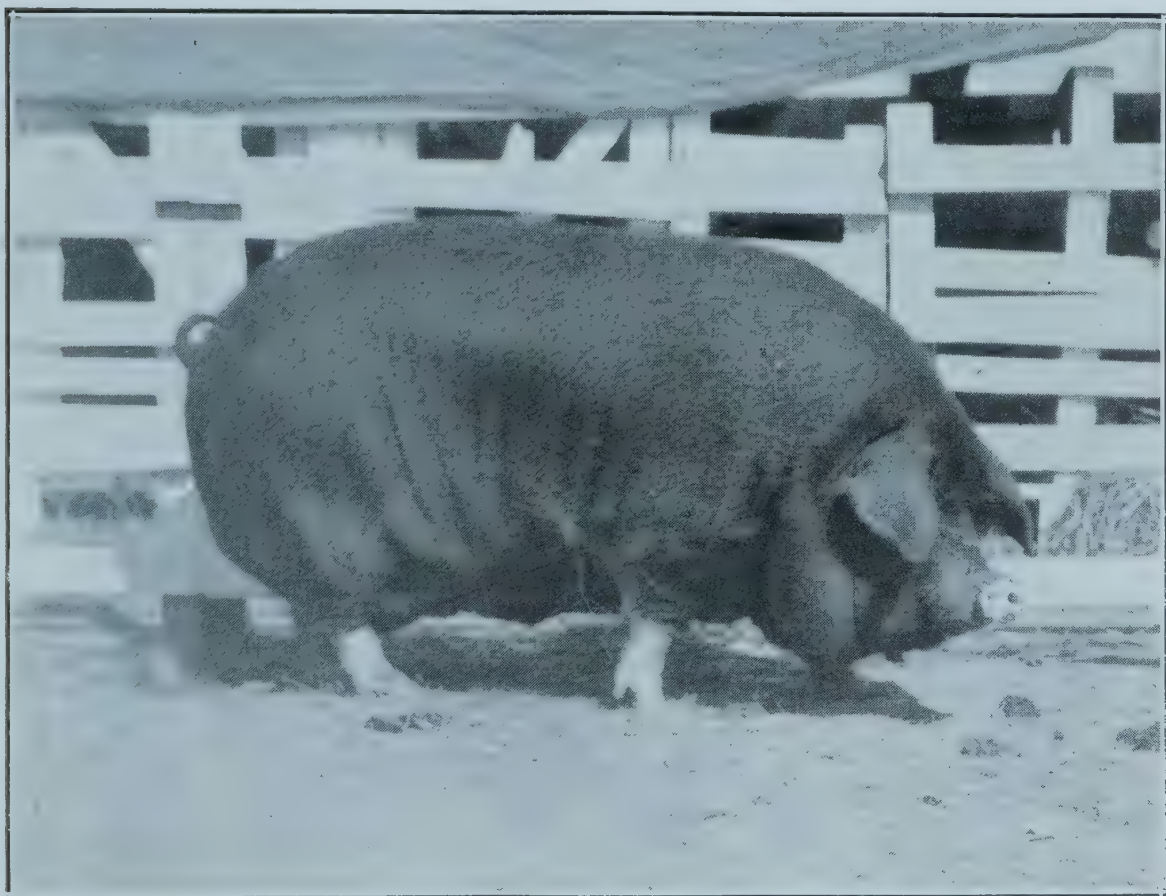


PLATE 102 (Fig. 3).—ANOTHER CHAMPIONSHIP WINNER. POLAND-CHINA SOW
"DANESBORO WINIFRED 172,"

Exhibited by Mr. A. N. White, of Penrith, N.S.W. Her quality and type are worthy of note, also her colour markings. She won championship honours at Brisbane Royal National Show, 1926, and has also won similar honours at other Shows. The photograph was taken when she was "in full bloom" for Show purposes, rather too fat for successful stud service.

ences, Mr. Gray says:—"I have been a breeder of pure-bred Poland-China pigs since 1882, and have never in-bred my stock. Have never had a Poland condemned on slaughter, and have sent pigs of this breed to the bacon factory for over twenty-five years. Am still breeding and selling boars and sows, and sending them all over the State. I bought my first Polands from T. H. Davey. He got his pigs from A. M. Woodhouse out of imported American stock about 1882, and in 1885 I bought a young boar from A. A. Dunnicliffe, of Burrawong, New South Wales. The sire of this pig was 'Crown Prince Imported,' his dam being called 'American Imported.' The records of his breeding also appear to have been lost, although it is understood

that he was of the 'Magie' strain bred by D. M. Magie, of Butler County, Ohio. In those days pedigress were not as carefully preserved and recorded as they are now nor were there any record associations for pigs in Australia."

Probably the earliest importations of value in improving the type of Poland-China in Australia were those made by the New South Wales Government about twenty-five years ago. These, at any rate, were the first to be recorded, and prominent amongst these was the boar named after that famous American statesman and President, Abraham Lincoln. Another boar imported at the same time was called "Roosevelt." He also came from the Flossmoor Stock Farms, Illinois, and, although not as true to type as "Lincoln," he left a lot of very useful stock in the studs in which he was used, principally at the Hawkesbury College.

Many years before this there was a boar imported whose name was "United States." He also appears to have come from the Flossmoor Farms, but his pedigree also has been lost. The boar "Abraham Lincoln" was the best Poland ever introduced into Australia prior to 1912. It was in that year that the New South Wales Government made a further importation for the Hawkesbury Agricultural College



PLATE 103 (Fig. 4).—AN ATTRACTIVE YOUNG SOW OF THE POLAND-CHINA BREED.

This type of sow, mated with a Tamworth boar, should produce bacon pigs of an ideal fleshy early-maturing class, such as is in keen demand in these days. She was bred at the Hawkesbury Agricultural College, N.S.W.

stud; these were high-class pigs, and it was the progeny of these importations that are recorded as the parents of most of the Polands we have to-day. Prominent amongst the animals forming this shipment was the boar called "Manager," 177881, bred by Jno. Francis and Sons, of Illinois. Amongst the sows in this same shipment was one called "Chicago's Pride," another sow was named "Iowa Beauty," still another was known as "Missouri Girl," whilst the other two were named "Wisconsin Pet" and "Kansas Pearl." Two sows, which formed part of the shipment of which the boar "Manager" formed a part, were named "Ohio Beauty" and "Ohio Gem," but neither of these sows were successful breeders, therefore none of their stock have been recorded.

Probably the most useful boar we have ever had, so far as a sire, was the boar "Sydney," 228381, bred by J. G. Drennan, of Chicago. This boar was imported

in 1913, and was an active, serviceable animal until quite recently. He has sired more Poland-Chinas than any boar it has been Australia's good fortune to import, and was the best and truest specimen of this now famous type. A fellow voyager from the U.S.A. in 1913 was a boar named "Judge K," bred J. S. Kemp, of West Kenney, Illinois. He was sired by a boar called "On the Dot," 106355, and was from a sow, "She's a Honey," 403940. He represented a less prepotent type, probably more suited to the State's trade than to the markets of the South. "Judge K" was, however, a good investment, as he left a host of useful pigs behind him, and it is the progeny of these two boars mated with representatives of the earlier importations that have been distributed throughout Australia.

More recently still Messrs. Wilson and Keppie, of "Woodlands," Paterson, New South Wales, have come to the rescue of Poland-China breeders and have imported several first-class animals from Canada. These have developed into very fine specimens of the breed, and their progeny are now being distributed; they are distinctly unrelated to the types formerly imported and are, therefore, filling a very useful purpose in the breed.

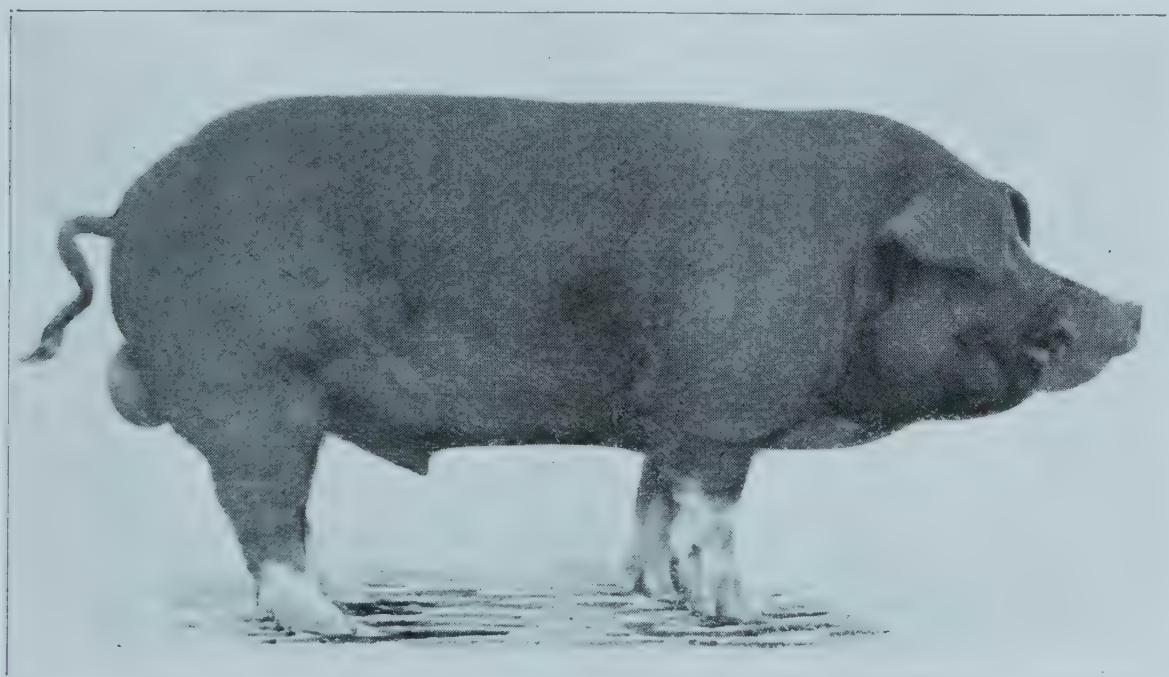


PLATE 104 (Fig. 5).—A PRIZE-WINNING POLAND-CHINA BOAR, "DANESBORO ONWARD" (189).

Exhibited by Mr. J. H. Whittaker, of the Broxburn Stud, Broxburn, Darling Downs. This photograph was taken on the farm when the boar was in ordinary breeding condition. He is of good type and quality.

The great call in Queensland is for a medium-type pig that will grow into a prime bacon pig, dressing from around 110 lb. to 125 lb. at six months of age. These same pigs would weigh round about 300 lb. live weight at twelve months old if they were forced on to those weights, but we find it unprofitable to exceed the 125 lb. dressed limit, and the tendency is now to reduce this weight to 120 lb. dressed, as representing the most profitable sale weight.

For the production of medium-weight porkers, weighing about 70 lb. dressed at four and a-half months old, the Poland-China is an ideal type, but there is not a great demand for pork in Queensland, hence we find the Poland-China more useful for crossing with the Berkshire grade or even with Tamworth grade pigs. A Poland-China boar mated with these types gives excellent results. Poland-Chinas are destined to become one of the most profitable of all breeds, provided they maintain a fair standard of prolificacy and do not become too fat, coarse, or heavy. As a breed they are not noted for great prolificacy—an average litter of eight must be considered good—but they have acclimatised well and appear to be more prolific under Australian conditions than they are in their native home. However, they possess a wonderful aptitude to fatten readily on a comparatively small amount of food,



PLATE 105 (Fig. 6).—PEN OF THREE POLAND-CHINA BARROWS. GRAND CHAMPIONS AT THE AMERICAN ROYAL LIVE STOCK SHOW, KANSAS CITY, MISSOURI, 1925.

Shown by Columbian Stock Farm Kansas City. Note their even development, characteristic shape, and neat attractive

whilst they are easy feeders and contented; these are features that must to an extent stand them in good stead even if they are less prolific than some of the other breeds.

In summing up their good qualities, one of the American Poland-China records says:—

- (1) They are the best known machines for manufacturing corn into pork. They thrive better than any other breed upon a diet composed mostly of corn.
- (2) They are docile, hardy, reasonably prolific, and almost invariably good mothers.
- (3) In large pastures they are not inclined to waste flesh by over-exercise; they have little or no desire to roam far away from home.
- (4) The better type Poland-China has as small a proportion of "offal," in comparison with the size of their carcass, as any hog in the hands of the general farmer. Their great feature is their easy and quick-fattening propensities with a tendency to very early maturity.

The recent importations of Poland-Chinas have done much to popularise and improve the type, but we want more of them as they are bound to prove of great value here in introducing their several valuable qualities into our herds. Poland-Chinas are the ideal type for the suburban pig farmer, as they cross well on comparatively common stock—stock that are usually deficient in compactness, early maturity, and good feeding qualities.

Special attention should be paid in selecting pigs of this breed to ensure purity of type. This is more important than with some of the other older established breeds; select long roomy sows that give every evidence of constitutional vigour. Avoid delicate sows, short in body and showing excessive fat, and with drooping quarters and coarse curly hair.

The scale of points adopted by the several Record Associations in America for the Poland-China breed is as follows:—

Colour.—Black, with white points, tip of tail, four white feet, white on face, or on nose, or on point of lower jaw, all to be perceptible without close examination; splashes of white on jaw, legs, flank, or few spots on body not objectionable.

Skin.—Fine and free from wrinkles.

Hair.—Fine, straight, smooth, lying close to and evenly distributed, covering the body well.

Head and Face.—Broad, even and smooth, wide between and above the eyes, slightly dished, tapering evenly and gradually to near the end of nose, broad lower jaw, head moderately short.

Ears.—Neither too large nor too small, but even, fine, thin, leaf shape, slightly inclined forward, standing up slightly at the base to within two-thirds of the tip, where a gentle droop should occur.

Jowl.—Broad, deep, smooth, and firm, carrying fulness back near to point of shoulders, and below the lower jaw, so that lower line will be as low as breast bone when head is carried up level.

Neck.—Wide, deep, short, arched on top from poll to shoulders.

Shoulders.—Broad and oval on top, showing evenness with back and neck, with good width top and bottom, and even smoothness extending well forward.

Back and Loin.—Broad, straight or slightly arched, carrying same width from shoulder to ham, ribs well sprung.

Flank.—Belly broad, straight, and full, flank well let down, with straight underline.

Hams.—Broad, full, deep, and long from rump to hock, fleshy, plump, and rounding fulness perceptible everywhere.

Legs and Feet.—Legs.—Medium length, straight heavy bone, well set apart, and squarely under body, wide above knee and hock. Feet.—Firm, short, and strong.

Action.—Free, clean, firm, easy, and graceful.

Prominent breeders of Poland-Chinas who usually have stud stock for sale include Queensland Agricultural High School and College, Gatton, Q.; J. H. Whittaker, Stud Piggery, Broxburn, *viâ* Toowoomba, Q.; R. L. Burns, Avondale, Wondai, Q.; W. Cordwell, Kureelipa, *viâ* Nambour, Q.; Yalden Bros., Cowper, Clarence River, N.S.W.; A. T. Beezley, Casino, N.S.W.; Wilson and Keppie, Paterson, N.S.W.; A. N. White, Penrith, N.S.W.; Trevor Brown, Narallan, N.S.W.; Hawkesbury Agricultural College, Richmond, N.S.W.; George Bevan, Brush Creek, Wyong, N.S.W.; John Alcock, Mogilla, Bemboka, N.S.W.; and others.

Farrowing Records.

A complete report on the farrowing records of Poland-China sows in the United States of America during the spring of 1923—February to May—and published in the "Poland-China Journal" recently, shows that sows in this breed can hold their own against any other breed so far as prolificacy is concerned. Reports from upwards of 4,000 litters farrowed by young and old sows in all sections of the States show an average of 8.5 to the litter. Statistics covering a period of seven years show that the Poland-China sow is maintaining her reputation for the production of numerous litters, for, as the following table indicates, the test has been a severe one:—

Year.	Number of litters reported upon.			Average number of pigs per litter.		
1917	3,448	..	8.63
1918	4,205	..	8.34
1919	5,264	..	8.03
1920	13,195	..	8.10
1921	10,000	..	8.48
1922	9,675	..	8.43
1923	4,283	..	8.50

These figures include the litters of both "tried" or proved breeders and yelts or gilts (young sows on their first litters). The general average of 8.36 pigs to the litter (tried sows and yelts included) on 50,070 litters, covering the period of seven years, shows a gradual increase from 8.10 to 8.50 from 1920 to 1923, proving that not only has the Poland-China sow repudiated the slander against her prolificacy but that she is steadily increasing her production. Reports on the 1923 spring pig crop were received from 4,283 litters with a general average of 8.50. The total number of pigs farrowed in these 4,283 litters was 36,387; of these 26,802 were alive at the time the reports were posted, making the percentage of pigs saved 73.65, as compared with 72.04 per cent. during the previous year.

Cross Breeding.

For the production of fleshy, early-maturing bacon pigs, such as those for which there is an increasing demand in these days, the Tamworth boar mated to Poland-China sows gives excellent results. Where it is not convenient to cross in this particular way, the Poland-China boar might be used and be mated with Tamworth or Tamworth-Berkshire cross sows. The Poland-China crossed with a Middle Berkshire also gives excellent results, while for a heavier bacon pig Large Yorkshire and Poland-China crosses should be ideal. So far experience has not demonstrated the value of crossing Poland-Chinas and Duroc-Jerseys together, though there would appear to be no reason why this cross should not prove of value; while where they have been tried the Gloucester Old Spot crosses with Poland-Chinas have proved equally valuable.

The Poland-China as a pure breed is increasing in popularity, though there is as yet in this State a limited demand for stud boars and sows. It is for their value in cross-breeding that better results might be expected, and for this purpose Tamworth and Poland-China crosses and similar type pigs should give better returns.

CARE AND HANDLING OF PIGS.

A special notice, as set out hereunder, has been issued to pig farmers, carriers, loading agents, and officials:—

Queensland bacon-curers affirm that the pig farmers of this State suffer loss to the extent of thousands of pounds sterling annually through careless handling of live pigs in transit to market. This is the result of excessive bruising and damage, deaths in transit, &c.

Your attention is specially drawn to the following general recommendations:—

Remember that the great demand now is for prime light to medium weight fleshy bacon pigs.

See that your pigs are properly fed and “topped up” on grain food for several weeks before marketing.

Give your pigs ample exercise during the growing and “topping up” stages. Do not keep your pigs closely confined in small sties, as this is conducive to overfatness and to soft, flabby fat.

Allow your pigs clean drinking water at all times, and provide shade and protection from the effects of the weather.

Be careful to market at correct weight; you should weigh your pigs regularly and accustom them to being handled and driven. Ask your factory for their current schedule of weights and prices.

Avoid beating the pigs with whips, rods, or sticks; every time you strike them you inflict a bruise which reduces the animals' value.

Do not feed your pigs on the morning of despatch (they travel better on an empty stomach), but provide plenty of clean water.

Co-operate with your neighbours in arranging assistance at sale and trucking time.

Firebrand your pigs with your registered firebrand. Ear marks and ear tags have not proved satisfactory; the factories prefer firebranding.

Be certain that the factory receives early advice *re* your consignment, the numbers, grade, brand, mark, and time and date loaded. Hand a written statement to the buyer or official loading agent.

Co-operate with the Railway Department and the factories in their endeavours to deliver your pigs at destination in the best condition possible.

Use purebred boars only and sows of the best breeding you can obtain in producing your pigs, and buy store pigs only from reliable sources.

Help us to help you succeed in the industry.

Write to the Department of Agriculture and Stock, Brisbane, for all available information on the subject of pig-raising.

Issued under the authority of the Department of Agriculture and Stock, Brisbane, Queensland, 1926.

PIGS AT THE MELBOURNE SHOW.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The Pig Section at Melbourne Show is always an interesting and attractive one, one well worth travelling a long distance to see, for it is one representative of an important industry, an industry that has for more than half a century been recognised not only as an important and very necessary one, but a profitable one to all concerned. Small wonder then that it attracts considerable attention from an ever-increasing number of exhibitors and ringsiders. Possibly, too, at this year's show greater interest was displayed than at former shows, for two or three new breeds were in evidence, and these in themselves created an additional attraction. Never before, for instance, has there been such a splendid display of Tamworth pigs at Melbourne Show as on this occasion, though perhaps the display in this breed does not yet come up to the standard of Sydney or Brisbane. There were also good entries and some

really choice stock in the Large Black and Large Yorkshire breeds, as well as in the recently introduced Gloucester Old Spot breed, a breed that this year created quite a stir among breeders and fanciers, many of whom were totally unacquainted with the type and character of this old world breed, a breed practically new also in the other States. The pork and bacon classes and the carcass contests, though not heavily catered for, created more than an ordinary amount of interest, and at times quite heated discussions. Strangely enough there were no entries in the Poland-China or Duroc-Jersey sections, in which a good deal of prize money was available, nor were there any crosses of these types exhibited in the pork or bacon classes. In this the Melbourne Show differs from both Sydney and Brisbane, for at both of these shows the entry of these two American breeds is quite an important one. Victorians as a body are somewhat averse from the American breeds, though it is difficult to understand this also, seeing that both the breeds referred to have made good headway north of Victoria.

There were many useful lessons to learn around the pig pens, and, as a slight departure from our usual custom in writing up show reports, several of these will be referred to here. Just as it happened, though the Berkshires and Middle Yorkshires, and even the Tamworths, were all well represented by really good selections of animals, these sections did not appear to create any stir, breeders accepted the decisions of the judges without demur and, as it were, went about their business. They were, of course, interested and business-like, but for some one or other reason it seemed to be an accepted fact that these three breeds were "set," there could be little or no argument about them, for it seemed to be accepted that there was nothing to argue about. It was when one appeared on the scene in the sections devoted to Gloucester Old Spots and Large Yorkshires and Large Blacks that all the argument was heard. It was here where the battles were fought and here where breeders appeared to rally to argue again, as they did in the days when the Tamworth breed was first introduced into our show rings. There were many useful lessons to learn, however, in the other sections referred to, for though one could safely say the Berkshires generally were of a high standard, there were many who complained that the "Berkie" as a breed is "slipping"—that means that they are not as good consistently as they were at the shows of several years ago. This point was stressed by many breeders, all of whom regretted such a tendency. It is largely accounted for by the fact that it has been very difficult, and it is still difficult, to secure satisfactory unrelated strains of a standard suited to our show yards. It seems unfortunate that this should be so, and at the moment there appears little hope of relief, at least in so far as importations from the old world are concerned, for the Foot and Mouth disease position overseas does not seem to improve to the extent desirable, nor does there seem at the moment much chance of the embargo against importation being lifted to allow of the introduction of fresh strains for many months ahead. This weakness among the Berkshires was displayed, perhaps, more among the young boars than among the sows, and possibly more among the sows and litters than among the mature stock, though it must be said in their favour that the prize-winning litters would be difficult to equal in any show ring. The same conditions, perhaps, do not apply to the Middle Yorkshires, for in this breed recent importations both to Victoria and New South Wales have been very productive, and their influence has been for good in this favourite Old White breed.

The Middle Yorkshire litters were as good as one would expect anywhere, and the general average was up to a high standard, though there were many weak animals in the younger classes, many that did not show to advantage. The champion Middle Yorkshire Boar would easily have won the championship of the show over all breeds if a class had been available, as he was pre-eminent and represented about the best we have yet seen in this popular breed. The first prize Tamworth boar in the class for boars under fifteen months old (and this boar was the championship winner) was the best Tamworth boar the writer has yet seen at any Australian show—he would have scored similar honours in the very much keener competition at either Sydney or Brisbane. This view was supported by the judge in this section, Mr. A. F. Gray, of the Hawkesbury Agricultural College, Richmond, New South Wales, who also was judge in similar sections at the two other Royal Shows referred to.

Unfortunately, space will not permit of a more extended reference to individual prize-winners nor to the entries of individual breeders, but the section was a good and productive one. It seems very unfortunate, though, that the Tamworth breed, noted for its prolificacy and quick growth, should so often be represented at these large State Shows in the sow and litter class by litters that are, in comparison with other breeds, poorly developed and lacking in polish, and that the litters should be of small families, fives, sixes, and sevens, with an occasional eight, and very rarely any more, while in the Berkshire and Yorkshire sections, tens and even twelves are not uncommon, all big hefty suckers attracting the crowd the whole day long—suckers that

indicate the truly prolific and profitable nature of the strains represented. It is difficult to understand, though it is largely accounted for by the fact that breeders of the Tamworth type do not pay the same attention to their show litters as do the breeders of the more successful Berkshire and Yorkshire types. On this occasion Large Blacks were represented by some really choice entries and litters, the best I think that have been exhibited here since the days when Mr. Herbert Garratt boomed the British Large Black and created such wonderful records, not only with matured stock but with sows and litters and young stock of all ages. The Large Yorkshires were a very representative lot, and in this case also the young stock showed off to advantage, while the Gloucester Old Spots were just as good as the exhibitors of this type could display them.

FLUSHING THE BREEDING SOW.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

In perusing the pages of several of the older established text-books on "Animal Husbandry," one frequently comes across the term "flushing," as applied to "flushing the mare," or the ewe or the sow or cow or as the case may be, in each instance prior to the time the female is mated.

This "flushing" is not a common term in Australian live stock literature nor is it a regular practice on our farms, consequently an explanation of the term "flushing the sow" before mating will be of interest to readers of this Journal.

The term "flushing" simply means a general stimulation of the whole of the internal organisation of the animal, the object being to increase the number of pigs produced at farrowing time. The purpose is accomplished by increased feeding of grain or by the use of fresh or more succulent pastures than have previously been available.

The practice is understood and practised more by the sheep men than by the breeder of pigs or of most of the other classes of live stock; still it is a well recognised old time as well as modern practice. The sheep man follows it by turning the breeding ewes into a fresh, succulent pasture just prior to "joining the rams," the time when the ewes are to be mated, the objective here being to secure a larger percentage of twins or a higher general average at lambing time.

There is no reason why the pig breeder should not adopt the same practice with his breeding sows, especially with sows that are advancing in age and that might otherwise produce rather unsatisfactory litters.

The most beneficial results are obtained when the flushing begins two or three weeks before the breeding season opens. Supposing that the sows have been running on pasture alone during the greater part of the "off" season; at the beginning of the breeding season, or when the sows are about to be mated, they should be turned into a fresh patch of rape, lucerne, or other green stuff that would furnish an abundance of the most succulent forage.

In the case of a single sow, the breeder might begin by feeding a slop composed of milk and pollard or wheat or maize meal, &c., and give more than the usual supply of green food. The idea is to stimulate the whole system without putting on any great amount of fat. It is, of course, expected that the animals will begin to gain a little more rapidly in early spring or as the breeding season opens, and the majority of breeders will see to it that their stock put on flesh at this time, but it is important that the sows should be in medium breeding condition and be gaining in weight and flesh at the time when they are mated. After the sow has been mated, continue the practice for a week or two before turning her out to pasture again.

All sows should, of course, be kept in good breeding condition during the gestation period, but there is no necessity that they should be "rolling" in fat—in fact, it is ruinous to load breeding sows (or boars) with fat, for it invariably leads to unsatisfactory results. On the other hand, it is disastrous to have breeding stock very low in condition, a condition described as "as thin as rags," for in this state good results cannot be expected. Plenty of good, nutritious food and water, plus compulsory and regular exercise plus a liberal supply of mineral matters, is what is required in order to secure best results, and "flushing" in the manner described above will certainly improve prospects and prove well worth while.

Neither boar nor sow should be used for stud purposes before they are ten or twelve months old. There is no reason why they should not prove satisfactory breeders up to seven or eight years old.



PLATE 106.—A BONNY YORKSHIRE LITTER JUST READY FOR WEANING.

This photograph illustrates the advantages to be obtained by "flushing" the breeding sow before mating and carrying her in medium breeding condition during her gestation and suckling period. The young pigs also have been properly cared for from birth and will not suffer ill effects as a result of weaning.



PLATE 107.—PUZZLE: FIND THE SOW.

The sow, the mother of these young pigs, was well "flushed" before mating, the result, as indicated, being a large, thrifty, vigorous litter. They were eight weeks old when the photograph was taken, and numbered fourteen. There is no reason why other sows should not do likewise.

WHITE WOMEN IN THE AUSTRALIAN TROPICS.

By J. S. C. ELKINGTON, M.D., D.P.H., Director, Division of Tropical Hygiene, Commonwealth Department of Health, of Australia.*

Tropical Australia is a very large country—more than twice as large as the combined areas of France, Germany, and the United Kingdom. It has all variations of tropical climates, since the greater part of it is over 1,000 feet, and many thousands of square miles are from 3,000 to 4,000 feet, above sea-level. Only about one-sixth is within the "humid tropics," which have over 50 inches of rain yearly, and possess those hothouse attributes which are popularly ascribed to all tropics.

Seventy years ago its only white inhabitants were a handful of pioneers. To-day more than 200,000 people live there, of whom the larger part were born there, many of them from tropic-born parents. Ninety per cent. at least are, as yet, in Northern Queensland, either in the neighbourhood of the coast, or along the railway lines, which stretch westward for several hundred miles. That their numbers are still increasing rapidly is apparent from the fact that in the three principal districts of North Queensland the population grew from 130,412 to 179,801 during the ten years which elapsed between the two census-takings of 1911 and 1921—that is, by nearly 39 per cent. The total increase in population for all Australia during the same period was 22 per cent.

Two of the five largest Australian tropical towns have over 20,000 inhabitants each, and three others have over 6,000 each. Tropical Australia thus has a definitely settled population, and is no mere changing house for transients. Its industries are extensive and prosperous. Educational and other facilities of civilised existence are developed to a high degree in the more closely populated areas. It is no longer a pioneering country, except in the far-back. Even there the motor-car, wireless, the aeroplane, and the ever-growing woman population have wrought great changes in a few years.

A Very Beautiful Country.

Much of it is a very beautiful country. There are great forest-shrouded mountain ranges, wide silver-breasted rivers flowing to a sunlit sea, open care-free plains, and jewelled tropic nights. Much of it is already occupied by a prosperous and healthy people, free above all other men and women. Vast fertile areas, cooled by elevation half a mile above sea-level, still hold out welcoming arms to those who have the courage to leave the crowds and the turmoil. For those who love not solitude there are other avenues to prosperity in pleasant and beautiful surroundings. But, for all, the will to work is essential.

The white resident of Tropical Australia is not merely an employer or director of coloured labour, living amongst a native population saturated with disease. He and his wife do not direct the work. They do it. Tropical Australia is the only tropical country in the world where every class of work from the highest kind of intellectual effort to the roughest and most arduous manual labour is done, practically exclusively, by white people.

These features have, of course, a very intimate bearing on the lives and welfare of the white women who live there. The silent-footed, ever-attentive coloured house-servant, who forms the comfortable background of tropical house-life elsewhere, does not come into the picture at all. Nor do the dysentery, or cholera, or smallpox, which he is always liable to contribute to the master's household. Aboriginal girls can sometimes be turned into excellent domestics, but they are hard to come by, except on outback stations, and are always liable to display disconcerting traits of character. White domestic help is costly and often unsatisfactory.

No Life for the Weakling—Cheerful, Healthy and Happy Housewives.

The average tropical Australian housewife thus works fairly hard. It is no life for the weakling or the grumbler of either sex. As some compensation it may be said that an extensive sociological inquiry carried out in 1924 from the Australian Institute of Tropical Medicine proved that the health of the average house-mother was good, and that for all classes of women and girls examined, those leading sedentary lives compared very unfavourably with those engaged in more active occupations. The same inquiry revealed that, as in non-tropical places, those housewives who organised their work on a definite plan, and who possessed knowledge of practical domestic science, had time for other interests and for rest, and were the most cheerful and happy.

*In "The Spectator" (London), 11th September, 1926.

The outlook of the average conscientious housewife comprises the welfare of her menkind, of her (other) children, and lastly of herself. The infant death-rate of any country is perhaps the most delicate and reliable of all tests concerning the general fitness of that country for family life. Any common peril will take first toll from the new-born lives.

Thriving Babies.

Let us see, therefore, how babies thrive in tropical Australia. From 1920 to 1924, the babies born numbered 26,175. Out of every 1,000 of these, 59 died before twelve months. 15,562 of them were born in the two most typically tropical coastal areas, but of these only 50 died out of each 1,000. During the same period, Australia generally (which has the fourth lowest infant death-rate in the world), lost 57 out of each 1,000 born. The tropic-born Australian baby's chances of survival are therefore substantially better than those of babies born in, say, London (69 per 1,000), Switzerland (70), England and Wales (75), Canada (79), or Scotland (98), during the last available statistical years. Curiously, the lowest of all Australian infant death-rates during these five years, occurred in the North-west of Western Australia, the very hottest part of tropical Australia, where out of the 200 born, only 8 died (40 per 1,000).

What of the risks to the mother? A full quarter of the population of Queensland lives in the tropics, and any unusual mortality amongst mothers in childbirth would obviously be reflected in the Queensland death-rates from this cause. But actually, the death-rate in childbirth in Queensland (5 per 1,000 live births) is lower than that for all Australia, and for New South Wales, Victoria, and South Australia.

The Australian tropic-born infant and its mother thus seem to be both doing well. Let us see how it grows up. It may be here mentioned that the 1924 sociological investigation showed that the number of children born per marriage in tropical Queensland is higher than the average for Australia generally. The infant is not, therefore, to be regarded as an only child.

Healthy School Children.

Analysed results of a long and extensive series of medical examinations of North Queensland school children have shown that tuberculosis, rheumatism, rickets, heart disease, and skin diseases are rare. Sight defects form but a fraction of the percentages found elsewhere in Australia, and in Great Britain. A tendency to pallor amongst tropical children has often been quoted as a proof of unhealthiness. This matter was worked out some years ago at the Australian Institute of Tropical Medicine, and was found to be a surface condition only, due to epithelial accumulation. The red corpuscles and hæmoglobin content of the blood differed in no way from those of children in cold climates. The tropical Australian child is distinctly taller and somewhat heavier (after relative clothing-weights are taken into account) than is his or her fellow-Australian of similar age in the Southern States.

Mentally, these children are, at all ages and in both sexes, as far advanced in school work as are children born or living elsewhere in Australia. Of 44 students at Cairns who, in 1924, had passed the examination entitling them to a high-school education, 39 had been born in the tropics, and of these 23 were of the second tropic-born generation.

After studying and working every type of tropical labour force, coloured and white, for over twenty years in the sugar fields of tropical Australia, a very large employer of labour recently recorded his opinion that, in this very arduous tropical work the British gangs headed the lists against all comers. By "British" was meant all British white nationalities, whether born in Australia or Great Britain.

Queensland's Low Death Rate.

Fully a quarter of the population of Queensland lives in the tropics, and over 90 per cent. of the population of tropical Australia lives in North Queensland. If the death-rate for tropical Queensland were high it would naturally appear in the general Queensland death-rates, but Queensland's death-rate is considerably below that for Australia generally. And the Australian death-rates are below those of any other country in the world except New Zealand.

The Need of Proper Housing.

Only in one feature have the results of scientific observation agreed with the statements of the adverse critics who have so often and so unjustly accused tropical Australia of being everything that a country should not be. The "tin house" is a blot on the landscape in every sense, and only too often the Australian tropic-dweller permits himself and his family to live under conditions of unnecessary discomfort. But the "tin-house" is a blot which is being rapidly removed. The Australian Institute of Tropical Medicine and the Commonwealth Department of Health have given much attention to the subject, and have erected models suitable to the climate and condition. This teaching is bearing fruit. With the rapidly increasing proportion of women in the population—between 1911 and 1921 the masculinity surplus fell from 17 to 12—housing conditions will tend rapidly to improve. But defective as they have been, and often are, it is clear that they have not had any bad effect on the physical or mental attributes of the people who are born and live amongst them.

Tropical Australia essentially suitable for White Habitation.

The present writer has personally known tropical Australia and its people for over thirty-five years, during the last fifteen of which he has been closely associated with the scientific investigation of its suitability or otherwise as a permanent habitation for a working white race. He is personally familiar with, and has studied on the spot, tropical living conditions in several parts of Asia, in Africa, in the Dutch Indies, Malaya, New Guinea, and the Pacific Islands. This, and the results of organised investigation quoted above, will explain why he has formed the matured opinion that tropical Australia is essentially suitable for habitation by white women, their menkind, and their children to many generations.

THE FIRST WHEATGROWERS.

Mr. Walter S. Campbell, of Vacluse road, Rose Bay, Sydney, writes:—

In Vol. XXIII., Part 5, 1st May, 1925, page 445, there appears a paragraph, "Sowed the First Grain, &c." Sir Alfred Robbins, as well as many other persons, have been misled by an error on Ruse's tombstone, "I sowed the first grain." John Ruse did nothing of the sort, at Parramatta, at any rate on the land granted to him. I have written the correct story to dispel the fairy tale about John Ruse. This appeared in the Sydney "Daily Telegraph," of which I send you a copy. Ruse sold his grant for £30 very soon, and pretty well came to grief afterwards. At least, he never seemed to succeed with his subsequent attempts at farming.

Following is the full text of Mr. Campbell's article in the Sydney "Daily Telegraph" of 24th April, 1926, which is of general interest, as well as of historical value:—

THE FIRST WHEATGROWERS.

By WALTER S. CAMPBELL, Ex-Director of Agriculture.

An idea seems to prevail that the first wheat produced in Australia was grown by James Ruse on Experiment Farm, Parramatta, but such was not the case.

Governor Phillip brought with him from England some seed-wheat, and he was instructed before leaving England to procure seed-grain from the Cape of Good Hope, where he obtained all that was needed. Very soon after arrival at Port Jackson cultivation was started at the head of Sydney Cove, according to Phillip's report to Lord Sydney, 15th May, 1788, "for raising a little corn" (that is, wheat), "for their stock; and this I have endeavoured to promote as much as possible, for I fear the consequences if a ship should be lost on her passage out with provisions. . . . The great labour of clearing land will not permit more than eight acres to be sown this year with wheat and barley."

On 9th July, 1788, he reported:—"The Lieutenant-Governor has about four acres in cultivation. I have from eight to ten acres in wheat and barley. The officers will be able to raise sufficient to support the little live stock they have. . . . All the corn raised this year and next will be saved for seed, and, if necessity should oblige us to use it, it would be only a few days' support for the colony."

The eight acres referred to were situated at the head of Farm Cove, on portion of the area now devoted to the Botanic Gardens. Cultivation work was begun at Rose Hill (Parramatta) towards the end of the year 1788, and in December, 1790, the wheat

was harvested with the barley. About 200 bushels of wheat was obtained, as well as 60 bushels of barley. The ground Phillip had under cultivation returned about 40 bushels of wheat.

After that, Phillip reported, 17th June, 1790:—"In order to know in what time a man might be able to cultivate a sufficient quantity of ground to support himself, I, last November, ordered a hut to be built in a good situation, an acre of ground to be cleared, and once turned up, it was put in possession of a very industrious convict, who was told if he behaved well he would have thirty acres. This man had said the time for which he had been sentenced was expired, and wished to settle. He has been very industrious, and has received some assistance from time to time, and now he tells me that if one acre more be cleared for him he shall be able to support himself after next January, which I much doubt, but think he will do tolerably well after he has been supported for eighteen months." So he should, indeed, under such favourable conditions. I judge from my own practical experience on far inferior land without any encouragement.

"I mention," continued Phillip, "the particulars respecting this man; some judgment may be formed of what an individual will be able to do if no assistance is given him more than the year's provisions." In his report, 8th November, 1791, Phillip encloses a note showing encouragement to settlers, amongst whom is James Ruse.

"To James Ruse.—One acre and a-half of ground broke up, assisted in clearing the heavy timber off five acres, clothed and supplied with the ration issued from the public store for fifteen months, a hut built, grain for sowing his ground for the first year, with the necessary implements of husbandry. Two sow pigs and six hens given him."

Captain Watkin Tench, in his "Account of Port Jackson," relates that when inspecting the cultivation going on around and about Parramatta:—"I next visited a humble adventurer who is trying his fortune here—James Ruse, convict, who was cast for seven years at Bodmin Assizes, in August, 1782. He lay five years in prison and on board the Dunkirk hulk at Plymouth, and was then sent to this country. When his term of punishment expired in August, 1789, he claimed his freedom, and was permitted by the Governor to settle in the country, to take in December following an uncleared piece of ground, with an assurance that if he would cultivate it, it should not be taken from him. Some assistance was given him to fell the timber, and he accordingly began.

"His present account to me was:—"I was bred a husbandman at Launceston, in Cornwall. I cleared my land as well as I could with the help afforded me; the exact limit of which ground I am to have I do not yet know; but a certain direction has been pointed out to me in which I may proceed as fast as I can cultivate. I have now one acre and a-half in bearded wheat, half an acre in maize, and a small kitchen garden. On my wheat land I sowed three bushels of seed—the produce of this country—broadcast. I expect to reap about 12 or 13 bushels." Ruse married, and found his wife of much assistance."

Timbered land in those days was cleared without removing stumps. Captain John Macarthur, writing to the Duke of Portland, 10th September, 1796, referred thus to clearing and cultivating land:—

"Two men who have been but little accustomed to labour can cut down the trees of an acre of the most heavily-timbered of ground; they can burn them off, and completely cultivate the whole with wheat in one month without labouring more than eight hours a day. As the season for sowing wheat commences in April and continues till the end of July, a settler beginning to clear his land as late as February can with great ease clear and cultivate six acres with wheat, allowing only the assistance of one servant."

When a resident pupil at Parramatta just sixty-five years after Ruse was farming his land, I was frequently roaming about Experiment Farm and on country in its primeval condition. I am able to say with certainty that Ruse's land was not heavily timbered, and could not have presented much difficulty in clearing. The timber was forest mahogany, eucalyptus microcarpa chiefly, some swamp oak, casuarina suberosa.

Ruse received his grant of 30 acres on 22nd February, 1792—an interesting historical event, as that was the first grant of land issued in Australia.

I may add that, although Ruse was not the first individual to grow wheat in Australia, he may have, possibly and probably, assisted others in the growing and sowing of that first produced.

Answers to Correspondents.

BOTANY.

In the course of the month the Government Botanist, Mr. C. T. White, F.L.S., addressed the following replies to correspondents, and which are of general interest.

Bottle Tree as Fodder.

E.R.A. (Mount Larcom)—

Bottle-tree is largely used as a fodder in Queensland wherever it grows. Analysis made by the Agricultural Chemist, however, showed it to have a low nutritive value, the material being just sufficient to keep stock alive.

Shade Trees in the Burnett.

F.G. (Mulgeldie)—Trees suitable for growing for shade at Mulgeldie are—

Bottle Tree (*Sterculia rupestris*).

Kurrajong (*Sterculia diversifolia*).

You may be able to find young trees in the Burnett scrubs; both transplant fairly readily. They can also be raised from seed.

Crows Ash (*Flindersia australis*).

Silky Oak (*Grevillea robusta*).

Celtis sinensis. Commonly called "Portuguese Elm" in Queensland, though a native of China. This tree is run out here and there along the Burnett River. It makes a good shade tree, but is deciduous. The leaves are relished by stock. We can send you seed in about two months' time.

Phytolacca dioica. The Phytolacca or Bella Sombra Tree. A very rapid growing tree, a good shade, and leaves and twigs relished by stock. Seeds have been forwarded. Free them from the pulp, sow in tins or boxes, and transplant to permanent positions.

Pines (*Pinus* spp.). The best exotic pine for Queensland is *Pinus longifolia*.

Figs (*Ficus* spp.) make good shade trees.

The foregoing is a small selection. Some of the scrub trees, and also forest trees, make good shade if left standing or planted.

"Mexican Clover."

W.G.S.R. (Eumundi)—

The specimen proved to be *Richardsonia scabra*, a native of Tropical America, naturalised as a weed in Queensland. In the United States it has been highly spoken of as a fodder under the name of Mexican Clover. J. S. Smith, in a Bulletin on "Fodder and Forage Plants," issued by the United States Department of Agriculture, has the following to say on this plant:—

"An annual weed, native of Central America and Mexico, which has been introduced into the Southern States and has now spread along the Gulf westwards into Texas. It is a succulent, creeping, prostrate plant, chiefly valued as a renovator of sandy fields on the coast. It is not a true clover, but belongs to the Rubiaceæ, the family in which coffee is included. Reports concerning it are conflicting. According to some it is a valuable fodder plant, while others affirm that neither cattle nor horses will eat it. On rich lands it can be cut, making a nutritious and palatable hay, which is readily eaten by all kinds of stock. Chemical analysis shows that the hay contains nearly as much nutriment as Red Clover. It is never cultivated, but appears as a weed after corn and cotton have been laid by. In Florida it is considered as an excellent plant to grow in orange groves as a mulch and to turn under for green manure, but not equal to either beggar weed or velvet bean."

Our experience here has been that stock practically never touch it; only one instance has come under my notice of stock taking to it, when a farmer in the Maryborough district wrote me to the effect that his horses were particularly fond of it. The name Wild or False Ipecacuanah has sometimes been given to the plant on account of the nodular roots.

Sarsaparilla.

H.O. (Waterford)—

Sarsaparilla of commerce consists of the dried roots of various species of *Smilax*, cultivated and wild in Tropical America and the West Indies. None of these species, so far as I know, is in cultivation anywhere in Australia, and you would have to obtain supplies or roots or seeds from abroad. If you are very keen on this matter you could write to the Director, Imperial Department of Agriculture for the West Indies, Barbadoes, West Indies, for further information.

We have two native species of Sarsaparilla; one of these, *Smilax glycophylla*, used to be collected by herbalists in New South Wales and also used in the manufacture of cordials. The parts used in this case were the stems and leaves. I have tested this same species in Queensland at different times, but in most cases the leaves when chewed have lacked the typical sarsaparilla flavour. Plants often vary a good deal as to their properties with geographical distribution.

Yams—Bulbils.

S.A. (Buderim Mountain)—

Both specimens represent the aerial tubers or bulbils of one of the yams (*Dioscorea bulbifera*). Some time ago I wrote to Dr. Burkill, the Director of the Botanic Gardens, Singapore, and a great authority on yams, regarding the edible qualities of the aerial bulbils of the various races of this *Dioscorea* grown in Queensland. He replied—

“There is every degree of edibility in the bulbils of *Dioscorea bulbifera* from something quite pleasant to something absolutely dangerous; and the only way of finding out what condition you have is to cook and taste discreetly. Once I was given the race which is called Otaheiti potato, and thought it tasted like kohlrabi. I have struck others very nauseous. Cut a bulbil and see if it goes brown quickly, in which case it is probably unfit to eat.”

Some Australian Plants.

F.H.D. (Monterey, California, U.S.A.)—

Pituri.—This is the dried leaves and stalks of *Dubosia Hopwoodii*, a small tree of the Solanum family (Solanaceæ) and a fairly close ally of the common Tobacco, and the poisonous principle has been found to be identical with nicotine. It stretches from Western Queensland, through the Northern Territory and Central Australia to the interior of Western Australia. The dried leaves are a source of trade between the natives for chewing; they are mixed with ashes. Sheep are sometimes poisoned by eating the young plants.

Caustic Vine.—This is *Sarcostemma australe*, a member of the Asclepiadaceæ. It has been suspected of poisoning stock, but there is considerable doubt on this point. Several of the same family are found in the United States, and are known definitely to be poisonous. It is a leafless climber, the milky sap of which is applied to sores, &c., by bushmen.

Nardoo is *Marselea Drummondii*, and is a mud or water plant. It is not a flowering plant, but is closely allied to the ferns—the parts eaten by the natives are the dried and pounded up spore cases and spores. It has very little nourishment. It is a shamrock-like plant, and as the water dries up the spore cases are formed and are easily gathered.

Edible Water-lilies.—The tubers of the big Blue Water Lily (*Nymphaea gigantea*) are eaten. The seeds of the Lotus Lily or Pink Lily (*Nelumbium speciosum*) are eaten. The gigantic Boo-bab (*Adamsonia Gregorii*) does not occur in Queensland, but only in the Northern Territory and north-west of Western Australia—a very fine series of pictures of these trees was recently published in the Transactions of the Royal Geographical Society of Australia (South Australian Branch). A drink is made from the diluted mucilage exuded from the trunk, and the seeds are eaten by the natives. Water is stored in pits or hollows of the branches and remains quite sweet; these holders often hold many gallons of water. Another boo-bab of similar growth and properties is found in the drier parts of Northern Africa.

For information on the aborigines, fauna, &c., you are advised to write to the Director, Queensland Museum, Brisbane (Mr. H. A. Longman), and on Geology to the Chief Government Geologist, Geological Survey, Brisbane (Mr. B. Dunstan).

Tanning Barks.

F.J.M. (Fletcher, Southern Line)—

The two chief sources of tan barks in Australia are *Acacia pycnantha*, the Golden Wattle of South Australia, and *Acacia mollissima*, the Black Wattle of Victoria and Southern New South Wales. Queensland barks from the Stanthorpe district have been received at Brisbane from time to time, but are not so good nor so regular in quality as the Southern barks. In regard to the differences between Black, Gold, and Silver Wattles these are almost impossible to give here, as the different names are very loosely applied in Queensland. Your best plan is to send small twigs (with flowers or pods if at all possible) for identification of all the wattles you have on your place. Number each specimen, retain a duplicate, and names will be returned to numbers.

You can get in touch with Brisbane tanners or with the Secretary of the Master Tanners' Association. A leaflet on "Wattle Bark—The Possibility of its Cultivation in Queensland" has been forwarded. The most impressive work is "Wattles and Wattle Barks" by the late J. H. Maiden, obtainable from the Government Printer, Sydney, or any bookseller. Price, 1s. 6d. Oak bark.—This has no commercial value. A number of barks of low tannin content are used in the bush, but have no market value as general tans.

Bracken Fern Eradication.

Inquirer (Brisbane)—

Where practicable one of the best means of eradicating bracken fern is regular scything. This is best done just before the ferns mature their spores; this weakens the underground portions and also prevents spread of spores. New leaves will spring up shortly afterwards, and should be mown within a few weeks of their growth. Burning off the dead fronds acts as a further check.

Bracken is a pest in all temperate countries, and "Farmers' Bulletin No. 687" of the United States Department of Agriculture is devoted to methods of eradicating bracken and other ferns from pastures. The conclusion drawn from experiments was that cutting was more economical than spraying. Salt was found to be the best material for spray solution. Arsenic was effective, but its use is a risk to stock. About 200 lb. of salt was required per acre, and was used in a strong solution—1 lb. to 1½ quarts of water.

Eradication by smother crops.—Some success in New South Wales has attended the use of Kikuyu grass for smothering bracken. Mr. Jas. N. Whittet, the Government Agrostologist of New South Wales, writing in the "Agricultural Gazette," of New South Wales, for January, 1923, gives the following method of procedure:—

"The fern country on which it is intended to grow Kikuyu should be ploughed and worked prior to planting in the spring, or if the soil be of an open free nature the fern fronds should be cut in the early spring, burnt, and the grass roots hoed in. On large areas drills 3 feet apart should be struck out with a single-furrow plough, the Kikuyu being dropped every 3 feet in the bottom of the drill, and covered with a light furrow, or by running a harrow along the drills in the direction in which they run. If the weather is at all favourable, the Kikuyu grass makes headway as soon as, or before the fern, and by winter there is only sufficient fern showing to protect the grass from frost. By the following spring a mat of grass has formed over the blank spaces and the fern is gradually choked out."

Bracken in England is a pasture weed, and Morse and Palmer in their work on "British Weeds" recommend summer cutting, and state that after cutting a dressing of lime is beneficial. They go on to say—

"The best method is spraying with diluted sulphuric acid (Oil of Vitriol). On rough hill pastures this may be done with knapsack sprayers. The water must first be put in the sprayer, and the acid very carefully and slowly added in the proportion of 1 pint to 4½ gallons of water. The first spraying should be given early in July, and a second in August. Cut surviving plants the following year. Breaking up and cultivating a pasture exterminates bracken most effectively."

Their July and August would, of course, correspond to our midsummer months.

Plants Identified.

G.P. (Herberton).—The specimens proved to be—

1. *Hibbertia volubilis*—Snake Vine. Has been suspected at different times as being poisonous, but feeding tests have given negative results.
2. *Legnephora Moorei*. Known as “Native Grape,” though not a true grape. The fruits are borne in grape-like bunches and have been eaten at times with fatal results—poisonous.
3. *Clematis glycinoides*—Native Clematis, or Headache Vine. Not known to be poisonous. The leaves, if crushed up and strongly sniffed, make the eyes and nose “run,” and are supposed to cure headaches.
4. Material insufficient for determination.
5. Material insufficient for determination.
6. *Epilobium junceum*. A native plant of the “Evening Primrose Family.” Common in damp places. Not known to be poisonous or harmful in any way.
7. *Aster subulatus*. A native of North America—fairly common as a naturalised weed in Queensland—not known to be poisonous or harmful in any way; most abundant on damp ground.
8. *Vitis hypoglauca*. A native Grape or “Water Vine.” Not known to be poisonous.
9. *Cordyline terminalis*. “Dracæna” or “Palm Lily.” Not known to be poisonous or harmful in any way.
10. *Aspidium molle*. A very common fern in damp paddocks; not known to be poisonous or harmful in any way.

You will notice from the above list that only one species (No. 2—*Legnephora Moorei*) is known definitely to be poisonous. Where there are numbers of weeds and a fair amount of secondary growth in scrub areas one commonly finds several plants more or less harmful.

Any plants that may be growing in the paddocks, but of which you did not send specimens are:—

The Tape Vine.—Round or heart-shaped leaves, glossy dark green above, paler beneath.

The Native Bryony or Wild Melon.—(*Bryonia laciniata*). A red fruit streaked with white wavy lines.

Wild Peach (*Trema aspera*), and, perhaps, others.

J.H. McC. (Dalby).—The specimens from Chinchilla proved to be—

- No. 1. *Podolepis longipedata*, a fairly common plant on the Downs and in parts of the West. It is not known to possess any harmful properties. I have not heard a common name applied to it.
 - No. 2. *Oenothera longiflora*. Evening Primrose. A native of South America, naturalised in Queensland, though not a bad weed. It is not known to possess any harmful properties.
- The vine from the Bunya Mountains is one of the Milk Vines (*Asclepiadaceæ*); in the absence of flowers or pods it is not possible to name the species. However, as so many plants of this family have a bad reputation in Queensland and elsewhere, it is always as well to cut them out of paddocks where they are growing as secondary growth.
- The smaller specimen is the Knot-Weed or Knot Grass (*Polygonum aviculare*), a common weed widely distributed over the temperate regions of the globe. It is not known to possess any poisonous properties, but its long wiry stems may cause mechanical injury if eaten in any quantity.

M.G. (Messines)—The specimens proved to be—

1. *Pomaderris prunifolia*. "Pomaderris."
 2. *Poranthera corymbosa*.
 3. *Zieria Smithii*. "Sandfly Zieria."
 4. *Boronia microphylla*. "Small-leaved Boronia."
 5. *Boronia repanda*. "Boronia."
 6. An Epacrid. Flowers would be required to determine the species.
 7. *Daviesia corymbosa*. "Bitter Pea."
 8. *Daviesia acicularis*. "Bitter Pea."
 9. *Dillwynia juniperiana*. "Parrot Pea."
 10. *Pultenaea microphylla* var. *cuneata*. "Bush Pea."
 11. *Bassiaea rhombifolia*. "Bossiaea."
- Hibbertia stricta*, without number. "Guinea Flower." A small yellow-flowered plant.

The collection was an interesting one, and contained one plant not previously found in Queensland—viz., No. 2, *Poranthera corymbosa*. I will take an early opportunity of making the record.

PIG RAISING.

Following are selected replies to correspondents by the Instructor in Pig Raising (Mr. E. J. Shelton, H.D.A.) in the course of the month, and which are of general interest:—

Dieting of Pigs.

H.B. (Crawford, Kingaroy Line)—

Apparently your pigs have been fed on a mixture of skim milk, water, and molasses, and that owing to the exceptionally dry weather skim milk has been in rather short supply, which indicates that the pigs have largely been "fed" on sugar and water, both very necessary items in any system of feeding, but both very poor foods in the absence of other more appetising and nutritious items. Development of Yellow Jaundice also indicates that the diet is unsuitable and the blood out of order, for it is apparent from description of post-mortem examination that death was, in part at any rate, due to Yellow Jaundice, a complication of diseases of the liver (congestion or inflammation probably). This may have been exaggerated by the too free use of molasses as a food and by constipation or loss of tone in the bowels. In any case it is evident that the trouble was largely due to faulty diet and to lack of green foods and grain, &c., conditions, presumably, largely the result of the dry season.

Swede Turnips as Pig Food.

W.T.C. (Byrnestown)—

Swede turnips are in reality not a good crop to grow for pigs. It is preferable to grow mangel-wurzels, for they are far more succulent, nutritious, and appetising to the pig, though they are slightly more difficult of cultivation, success depending largely on securing seed of fresh stocks from a reliable seed merchant. Swede turnips will be appreciated most by mature stock, breeding sows and boars, and to them they should be fed raw. If using them for young pigs they are best cooked and used as part of a morning mash. Dwarf Essex rape is the crop usually recommended in preference to Swedes, but rape does not form a bulbous root, its food value being in the growth of succulent leaves. It is a winter crop, and is therefore of much value on most farms.

VETERINARY.

Worms in Sheep.

H.G.S. (Jericho)—Mr. W. G. Brown, Instructor in Sheep and Wool, advises—

I am much interested to learn that your correspondent's sheep are infested with worms in the large intestines. I have submitted his letter to Mr. A. H. Cory, M.R.C.V.S., Chief Inspector of Stock, and he asks that specimens of these worms be sent along for identification. He states also that the action of arsenic plus the excessive amount of salt administered will probably make a deadly poison. In any case send along the worms from the intestines.

The formula of feeding shows that this grazier has been feeding 100 lb. of meal to 60 lb. of salt, with other (non-poisonous) ingredients. Hungry sheep placed on a meal and salt diet in the above proportions would certainly be poisoned in greater or less degree. In my opinion it has caused nearly all his losses. Cut out the iron sulphate and the raw linseed oil. Give the salt separate from the meal, and he will find that his sheep will do well. Salt is a purgative. Don't ever forget that. Excessive salt causes severe diarrhœa. To put it all concisely I shall answer his questions seriatim—

- (1) Are these worms in the intestines stomach worms?

Answer: Cannot say unless you forward some specimens. Stomach worms may be found outside the fourth stomach as far along as the Calcum (Bung gut in the vernacular), but if they leave the stomach they die and are promptly dissolved by the gastric juices.

- (2) If so what drove them out of the stomach?

Answer: Cannot say without knowing the worm.

- (3) Should the drench act on the worms in the intestines just the same as if they were in the stomach?

Answer: The drench naturally weakens as it goes along the alimentary canal, mostly by absorption. I have yet to know that the worms you saw were really stomach worms (*Strongylus contortus*).

- (4) What caused the sheep to be so sick after the drenching? Would it be from the effects of salt?

Answer: Undoubtedly nearly all your troubles are caused by the use of excessive salt.

- (5) Is it advisable to drench ewes heavy in lamb?

Answer: Not advisable, but if heavily infested there is a choice of two evils—death by the worms, or lambing troubles caused by the knocking about of the animals. There is no danger from the drench; it is the knocking about the animals get in the most critical time of their life (parturition) that the danger lies. Handle them carefully, and there will be little trouble.

- (6) What causes the sheep to have diarrhœa?

Answer: In your case, excessive salt.

- (7) What amount of salt does a sheep require to obtain best results?

Answer: When sheep are salt hungry and are offered salt they will consume at the rate of 4 oz. per week for the first ten days. This amount dwindles until the regular requirements per week per head is about 1½ oz.

- (8) What would be a suitable lick for this district?

Answer: 100 lb. salt, 10 lb. finely-ground Nauru phosphates; both cheap and effective.

- (9) Would the worms affect the sheep in the intestines as much as in the stomach?

Answer: Depends on the worm. Tape worms are intestinal worms. Broadly, stomach worms are not. I cannot say that I know others than the Nodule worm. It is known by the nodules to be found all along the intestines, but unless in great numbers are not regarded as sheep-killers.

- (10) Can you advise me as to the best method and drench to shift the worms from the intestines?

Answer: The arsenical drench of this Department is good for the worst worm, the Stomach worm, and should be good for the intestinal worms you speak of.

Kindly send along specimens. Under separate cover is forwarded "The Farmer's Sheep in Queensland" Bulletin, and "Stock Foods," which may be informative on sheep matters.

Vitamins.

P.B. (Ipswich)—The Agricultural Chemist, Mr. J. C. Brünnich, advises—

As a rule stock living under natural conditions, with plenty of green pasture and herbage, get a sufficient supply of vitamins. An extract of an article by Prof. Harden gives all details up to date.

Following is the extract referred to by Mr Brünnich:—

“When we come to consider the vitaminic requirements of an average individual we have to confess to a lamentable lack of accurate information. We are, indeed, in a better position with regard to many of the lower animals, for it has become possible to ascertain with some degree of accuracy by direct experiment the amount of milk or orange juice necessary to protect a guinea pig or a monkey from scurvy, or the amount of yeast which will perform a similar function for a rat or pigeon with regard to polyneuritis. One important conclusion which has been definitely ascertained in this respect is that different animals, even although closely related, vary very considerably in their need for vitamins. A striking instance is afforded by the guinea pig and the rat, both rodents, in relation to the anti-scorbutic vitamin. The guinea pig is very sensitive to lack of this principle, and on a scorbutic diet rapidly shows symptoms of scurvy, and finally dies of the disease. The rat on a similar diet shows scarcely any sign of the absence of the principle, grows to a good weight and produces young. Careful examination has, indeed, revealed a certain inferiority in the scorbutically fed animals, but scurvy never develops. A less extreme difference is shown by a comparison of the anti-scorbutic needs of the guinea pig and the monkey, animals which are both affected by scurvy. The latter, of about ten times the weight of the former, requires almost exactly the same amount of anti-scorbutic (orange juice or milk) to protect it from scurvy.”

TABLE 1.

—	Vitamin A.	Vitamin B.	Vitamin C.
Synonyms	Fat Soluble A.	Water-soluble B. Anti-neuritic	Water-soluble C. Anti-scorbutic
Effect of deficiency	Retarded growth ending in death Eye-disease (Keratomalacia) Probably one factor in causation of rickets	Retarded growth ending in death Beri-beri Polyneuritis of birds, rats, &c.	Scurvy
Chief sources	Animal fats Fish liver oils Green vegetables Egg-yolk Butter and milk Oleo-margarine, in proportion to animal fat	Seeds, particularly in the germ, pericarp and aleurone layer Yeast Egg-yolk	Green vegetables (especially Cruciferae) Orange and lemon juice Tomatoes Germinated seeds Swedes and turnips
Present in smaller amounts	Oil-seeds Carrots	Meat Milk Potatoes and some other tubers and roots Green vegetables Some fruit juices	Meat Milk Potatoes and some other tubers and roots Many fruit juices Dried vegetables
Absent from	Most vegetable oils Most lard Most margarine White bread Egg white Yeast Purified proteins and carbohydrates	White bread Polished rice Fats Egg white Purified proteins and carbohydrates Sugar and Corn starch	Seeds White bread Fats Yeast Purified proteins and carbohydrates

General Notes.

Introduction of Sugar-cane Plants.

Further Proclamations, Nos. 11 and 12, have been issued under the Diseases in Plants Acts. No. 11 prohibits the introduction into Queensland from New South Wales of plants or portions of plants of every variety of sugar-cane unless a permit in writing be first granted by an inspector.

Northern Pest Infested Lands.

The lands of the suppliers to the South Johnstone and Tully Central Sugar Mills have been declared cane pest infested areas under the Sugar Experiment Stations Acts.

Cotton Prospects.

The Minister for Agriculture (Hon. W. Forgan Smith) mentioned, in the course of a recent Press announcement, that the cotton-growers were considerably concerned with the present prospects of their industry. It will be remembered that representatives of the cotton-growers approached him as Minister for Agriculture and asked that the State Government agree to the decontrol of the industry. He informed the cotton-growers that in the event of the growers being able to arrange for a bounty on seed cotton from the Federal Government, the State would be prepared to grant the request for decontrol.

Investigation and report upon the matter of a bounty on seed cotton was referred by the Federal Government to the Tariff Board. The Tariff Board in turn recommended to the Federal Government that a bounty on seed cotton be granted. The bounty to be at a rate of 2d. per lb. on seed cotton for six years, and a tapering bounty for the remaining four years of the term.

The Federal Government did not accept in entirety the recommendation of the Tariff Board, but agreed to a bounty on seed cotton for five years at a rate of 1½d. per lb., and additionally made provision for monetary assistance to cotton spinners with a view of establishing a secondary industry of cotton spinning.

If the growers find that the rate of bounty is insufficient to enable them to carry on in cotton-growing with reasonable prospects of success, it is for the growers to prepare a case and submit the whole matter for consideration by the Federal Government.

It is not the function of a State Government to give a bounty super-imposed upon a bounty granted to any industry by the Commonwealth.

Action should be taken in this matter without delay, as the time for the planting of cotton will soon be passed. Prospective growers of cotton would be well advised to plant areas under cotton without further loss of time, as it is obvious that if favourable opportunity to plant the seed is not taken advantage of there will be no cotton crop to harvest and no bounty collected by the growers.

It is true that the price of cotton on the world's market has declined, and values to-day are comparatively lower than those that have prevailed for many years past.

Should it be that the bounty granted to cotton spinners by the Federal Government operates in the direction anticipated by the Commonwealth authorities, it appears there are prospects of the cotton-growers receiving some monetary advantage upon cotton grown by them that is used for manufacturing purposes in Australia, and although a definite statement as to the return to the grower that will be derivable from this source cannot be stated at this juncture, it does appear that growers can expect to receive benefit from this source. There are additional channels through which economy might be exercised, such as reduced costs of ginning, and these are matters that are being investigated, and should it be found possible to devise means whereby the return to growers can be increased as a result of action along the lines indicated, it might ultimately be that growers will receive a higher

rate for their seed cotton than a superficial examination of the existing prospects seems to indicate.

In any case, I would strongly urge growers to give urgent attention to the matter of setting an acreage under cotton seed immediately the soil conditions are favourable for planting.

Australian Chilled Beef for the United Kingdom Market.

Commenting on the recent experimental shipment of chilled beef from Australia to London carried out by the Perfect Food Process Pty. Ltd., the "Cold Storage and Produce Review" of London in its leading article of the issue of 19th August states:—"The shipment has demonstrated, in spite of the mouldiness of a portion of the cargo, that the Antipodean voyage is not a bar to chilled meat carriage. No chemical preservatives were used, and the temperature at which the meat was landed was distinctly higher than that at which a considerable portion of the Argentine chilled beef, sometimes frost-laden, is now marketed. Comparing the Australian trial shipment with the South American chilled experiments of twenty years ago, the present experimenters have nothing to be ashamed of. Having said this much, we have to pause in our conviction as to the immediate hopefulness of the system as applied to the Australian beef export business. Australia has been so neglectful of the counsel to improve her herds that, as a matter of common knowledge, and in spite of her large total holding of 15,000,000 cattle, she has nothing like the quantity of chilling-quality meat to gather in comprehensive cargoes for competition with the Argentine product in European markets. Everyone knows that in this position the Argentine powers that be, and they are many, could easily quash such new competition, if it were practicable. It would be merely an ordinary step of commercial self-protection. Of course, if Australia could induce the British navy, or army, to take its meat in chilled shipments at, say, a parity of price with market rates, that would be of considerable assistance. But the Commonwealth industry has got to improve its herds by regularly systematic breeding—not by the occasional importation of a pedigree bull—by the reform of its transit conditions between works and ships, and by the economic arrangement of its works centres. Only thus can the Australian beef export trade get properly on its feet, and although it will take more than a season or two to accomplish the work Australians must have faith to enter upon the task set before them, as there is no other hope for Commonwealth beef export."

According to the same journal, the shipment comprised nearly 800 hindquarters of beef (752 from Brisbane and 41 from Wyndham). On discharge of the meat from the vessel a large proportion of the Brisbane quarters were found to be extensively affected by surface moulds. The Wyndham beef was, however, perfectly fresh in appearance and sold at from 3s. 10d. to 4s. per 8 lb. wholesale. The interior of the meat affected by mould, and even the fat, was found to be quite fresh and sound, and this meat marketed in pieces was reported to have made an average of 3.8d. per lb. net.

The quality of the meat was declared to be excellent. It is believed that a leading cause of mould was the failure to reduce the initial temperature of the chamber at Brisbane immediately prior to loading.

In spite of the presence of mould on the Brisbane quarters, the trade as a whole passed favourable comment on this experiment, which is considered to have proved the possibility of carrying beef over the long voyage at a chilling temperature. The meat which formed the basis of the first experiment carried out last year was wrapped in two stockinette covers, as well as an outside hessian wrap, one of the stockinette covers having been washed in boracic water; but no preservative at all was used on the meat in the recent experiment.

According to the journal, interest has been displayed in the further intentions of the Perfect Food Process Pty. Ltd., and it is believed that more than one shipping company is favourable to the fitting of a vessel or vessels with the company's equipment.

Sugar-Cane Levy Regulations.

Regulations have been issued under the Primary Producers' Organisation Acts empowering the Council of Agriculture to make the following levies on canegrowers:—

- One half-penny per ton on all cane delivered at the Qunaba Sugar Mill;
- One half-penny per ton on all cane delivered at the Bingera Sugar Mill;
- One farthing per ton on all cane delivered at the Rocky Point Sugar Mill;
- One penny per ton on all cane delivered at the Pleystowe Sugar Mill; and
- One penny per ton on all cane delivered at the Millaquin Sugar Mill;

during the 1926-27 season.

These levies will be utilised for the following purposes:—

Qunaba and Bingera.—To meet Mill Suppliers' Committee expenses.

Rocky Point.—To defray local expenditure in connection with the functioning of the Rocky Point Mill Suppliers' Committee.

Pleystowe.—To defray the expenses connected with the appointment of two farmers' representatives to this mill.

Millaquin.—To defray the expenses of a grower's representative at the Millaquin Mill, and any other expenses which the Mill Suppliers' Committee may have.

Provision is made for the cane suppliers to the above mills to ask for a referendum to decide whether or not the levy shall be made, and such petition must reach the Minister by not later than the 1st November next.

Cotton Market—The American Decline—Relation to Local Crops.

“The report from New York that United States Government experts forecast a cotton crop of 17,454,000 bales, the largest on record, and that there has been an appreciable drop in the price for American middling cotton backs up the contention of the Queensland Department of Agriculture that the Queensland farmer should endeavour to grow long staple cotton of a good grade and quality,” said Mr. W. G. Wells (Cotton Specialist of the Department of Agriculture), in the course of a recent Press interview.

Mr. Wells added that advices from Liverpool indicated that at least 2d. per lb. premiums are being received for the greater portion of the Queensland crop, and an appreciable quantity is receiving even higher premiums.

“No attempt,” said Mr. Wells, “has been made to estimate the effect such a yield as reported from the United States will have on prices for the coming season. It must be understood that this is a forecast as to the possible crop which may be obtained this season in the United States. October is the month when the bulk of the picking is being accomplished in the United States, but a very large amount of cotton will be harvested in November and up to the end of December. As these are the beginning of the winter months in the United States of America, and the fact that the crop is later this season, it can be expected that a considerable proportion of the crop may be of low grade. If this occurs it will mean that the price of the lower grades of cotton of an inch or under will be low for the next two years, as there is a large carry over of this quality of cotton from the past season's crop.

“This makes it all the more imperative for the Queensland grower to give his crop the very best methods of cultivation, such as early thinning and sufficient scuffling during the season, so as to maintain a good mulch free from weed growth. In other words, every effort should be made to produce as high a quality of cotton as we can during this coming season.

“If we can maintain the standard of the higher grades of the past season's crop it is anticipated that very substantial premiums will be obtained for Queensland cotton, which, with the Commonwealth Government's bonus, should make cotton-growing a profitable enterprise for the Queensland farmer.”

Staff Changes and Appointments.

Mr. H. J. Freeman has been appointed an Inspector under the Diseases in Plants Acts.

Mr. H. B. Carney, Clerk of Petty Sessions, Childers, has been appointed Chairman of the Childers and Isis Local Sugar Cane Prices Boards, *vice* Mr. A. H. Anderson, transferred.

Mr. J. R. Collier, Inspector of Slaughter-houses, has been also appointed Inspector of Stock.

Mr. C. F. Adermann has been appointed Chairman of the Peanut Board.

The following transfers of Inspectors of Slaughter-houses have been approved:—

J. R. Collier, from Maryborough to Cairns; and

E. C. Todd, from Cairns to Maryborough.

Mr. H. C. J. Hansen has been appointed Canegrowers' Representative on the Farleigh Local Sugar Cane Prices Board, *vice* J. J. Hand, resigned.

Mr. J. C. Pryde has been appointed Inspector of Stock, Brands, and Slaughter-houses, as from the 1st November, 1926, to the 30th November, 1926.

Mr. F. H. Hyde has been appointed Chairman of the Northern Pig Board until the 31st December, 1926.

Mr. H. Barnes has been appointed an Inspector under the Diseases in Plants Acts.

The resignation has been accepted of Mr. W. H. Austin as Queensland State Executive Officer on the State Meat Advisory Board.

The Public Service.

It has become the fashion at various times to joke about the public servant who is tied down by rigid regulations, which tend to destroy any initiative an individual may possess. However, in spite of that, it produces men of high character and independence of thought, who climb to the top, and by their sterling abilities keep for all public servants that respect which the community owes them. Many a brilliant lad goes into the service because he must do something, and the position is open to him. Perplexed parents, with boys whose abilities are general, find relief from their worries by placing the young hopeful in the Government employ. Not many are able to launch their children in professions. So it happens that the sons begin life by serving the public in one of the many Government departments of the country. Not all remain there. The service is no place for a restless spirit or for the man with acquisitive ambitions. The essential psychology of the public servant is to wish to serve rather than to acquire, and there are many intellectually brilliant men who prefer a life of service to one of making money. It is a grand thing that such men find their way into the public service, and reserve their capabilities for the benefit of the country as a whole, when they might do far better for themselves, in the material sense, in other walks of life, and it is well to bring these facts before the community so that they will not be forgotten.

There are men in the service who could make far more money outside of it. There is no limit to what they might achieve in commercial and industrial walks of life. Many instances could be quoted of brilliant employees of the Government who have been snapped up by private firms at salaries which would excite the cupidity of most people, but when men of high quality and great integrity find their feet in the civil service, they discover that the ideal of service to the community carries with it compensations which cannot be assessed in coin of the realm. And those who give whole-heartedly are always greater than those who take. Our public service has been singularly fortunate in its leaders. Out of the many hundreds whose salaries come out of the Treasury, the man for the job has always been found. There are youths to-day with their feet on the first rung of the public service ladder who will one day lead their departments. The "old original heads" are gradually disappearing, but they are leaving behind them standards of character and ability which should establish traditions to which the younger generation will aspire.—"Dalgety's Review."

“Stock Foods”—Corrigenda.

In Mr. J. C. Brünnich's excellent pamphlet on stock foods, published recently and which was also reproduced in the September Journal, several inadvertent errors occurred. Following are the corrections:—

Page 26, pamphlet; page 202, “Queensland Agricultural Journal (26th September)—

Ration I. for hens should read—

9 lb. wheat, 5 lb. pollard, 5 lb. bran, and 15 lb. (1½ gallons) skim milk.

Table I. in pamphlet—

Column 1 to read Moisture (not Mixture).

Column 16—3rd line from the end should read ∞ (infinity), not 8, as molasses do not supply any digestible protein.

Royal Society of Queensland.

Dr. J. V. Duhig, M.B., presided at the last meeting of the Royal Society of Queensland.

Dr. W. H. Bryan exhibited Permo-Carboniferous fossils from Cressbrook Creek. These prove the existence of a hitherto unsuspected area of Permo-Carboniferous rocks. The fossils included *Trachypora wilkinsoni*, *Monilopora nicholsoni*, *Zaphrentes* sp., *Strophalosia* sp., *Mourlonia* sp., *Pleurotomaria* sp., and *Conularia* sp. In fossil content, lithological character, and association with acid volcanic rocks, the new area can be closely correlated with the Condamine Beds of the Silverwood-Lucky Valley area.

Dr. E. O. Marks exhibited pebbles of igneous rocks from sandstone at Deception Bay. These pebbles suggest a Tertiary Age for the sandstone or Mesozoic igneous activity.

Mr. A. K. Denmead exhibited, on behalf of Rev. C. H. Massey, a number of rock specimens apparently of the Brisbane Schist Series which were obtained from Kanaipa Point, Russell Island, Macleay Island, and Stradbroke Island. These prove that the Brisbane Schist Series is more extensive in the southern part of Moreton Bay than had been supposed, and suggest that other adjacent areas which are assumed to represent more recent series may prove to be in part made up of deeply weathered Brisbane schists.

Professor Richards and Drs. Bryan and Whitehouse commented upon the exhibits.

Mr. A. P. Dodd read a paper entitled, “The Genus *Scelio* Latreille in Australia (Hymenoptera: Procto trypoidea).” The author recognises twenty-nine species. The following new species are described:—*Scelio concinnus*, *S. fulvithorax*, *S. sulcaticeps*, *S. perspicuus*, *S. improcerus*, *S. pilosifrons*, *S. contractus*, *S. asperatus*, *S. notabilis*, *S. amoenus*, *S. nigrobrunneus*, *S. ignobilis*, *S. panithorax*. Mr. H. Tryon and Prof. Goddard commented upon the paper.

Mr. H. Tryon read a paper entitled, “Queensland Fruit Flies (Trypetidae, Series I.” The following new species are described:—*Chaetodacus fagraea*, *C. halfordiae*, *C. bryoniae*, *C. barringtoniae*, *C. musae*, *C. bancrofti*, *C. jarvisi*, *Dacus signatifer*, *D. niger*, *Rioxa araucaria*, *R. jarvisi*, and *Bactrocera pulcher*. The following species are recorded for the State:—*Chaetodacus dorsalis* Hendel, *Bactrocera caudatus* (Fabr.) Bezzi. For *Chaetodacus tryoni* Froggatt, twenty-nine hosts included in twenty-two families of indigenous fruits and forty-three hosts included in eighteen families of naturalised economic fruits are enumerated. Professor Goddard commented upon the paper.

On the motion of Professor Richards, seconded by Mr. H. Tryon, the Society's sympathy with the widow of the late Charles Hedley was expressed. Appreciative acknowledgment of Mr. Hedley's notable work for the general advancement of scientific knowledge and in connection with the activities of the Great Barrier Reef Committee was also made.

The development of Permo-Carboniferous beds in Queensland was the subject of a discussion towards the conclusion of the meeting. Drs. Whitehouse and Bryan, Mr. J. H. Reid, Professor Richards, and the following visitors (Professors Benson and Leo. Cotton and Mr. E. C. Andrews) took part in the discussion.

Fiji Disease of Sugar-cane.

Proclamation No. 12 prohibits the removal of any sugar-cane plant or part of plant to be used for the purpose of planting, from any place situated in the counties of Ward, Stanley, Canning, and March, owing to the prevalence of Fiji disease of sugar-cane. If, however, an inspector is satisfied that any particular place is and always has been free from the disease, he may issue a permit for the removal of sugar-cane plants from such place, which must be mentioned in the permit.

Dogs and Hydatids.

The hydatid cysts found in stock and also in man are only one part of the life cycle of a parasitic worm known as the echinococcus. This is a tapeworm which is found in the dog's intestinal tract, the ripe eggs being passed in the excreta. Stock become infected by eating herbage which has been contaminated with these eggs either directly or blown on to it by the wind when dried into dust. Once the eggs are swallowed by stock or man they develop into immature worms, which make their way into the liver or lungs, and sometimes other parts of the body, where they develop into the well-known hydatid cysts. These cysts may slowly increase in size, and give rise to symptoms accordingly, but they do not develop into the mature tapeworm until swallowed by a dog or similar animal. Once a dog eats raw meat containing hydatid cysts the cysts soon become dissolved, and the mature tapeworm appears, and the whole life cycle begins again. The only way to treat hydatids in man and stock is to prevent them from eating food contaminated with echinococcal eggs from infected dogs. This means cleanliness, and care in handling dogs in the case of man, while for stock it means keeping infected dogs away as far as possible from their pasture. In both cases all infected dogs should be treated, and every care taken to prevent reinfection by keeping dogs away from the slaughter yards and raw offal, and seeing that the liver and lights, &c., are well boiled before being used as dog food. Contrary to general belief, rabbits are not so often infected as sheep, and rabbiters' dogs are not, as a rule, so heavily infected with tapeworms as are station or drovers' dogs. The treatment of tapeworm in the dog is usually by areca nut or, better still, by a mixture such as:—Felix mas (male fern), 30 grains; areca nut, 90 grains; mixed with 1 oz. mucilage of acacia and 10 to 15 drops of chloroform. This mixture should be given in one dose after a preliminary twelve to twenty-four hour fast, and should be followed by a purgative (not castor oil). If necessary the treatment should be repeated in forty-eight hours. By such routine treatment of infected dogs, and the destruction or proper cooking of all offal, particularly livers and lights, hydatid disease would become very much rarer than it is at present in Australia, which has the unenviable reputation of being the home of hydatids. No treatment beyond surgical removal can deal with cysts themselves.—“The Australasian.”

“Soft Bone” in Cattle—A North Coast Farmer's Experience.

Mr. Walter Tronson, Ringwood, Pomona, writes—It may interest you and your department to know how I have got on with combating our trouble known as “Soft Bone” on our coastal country. Some years ago we had trouble with cows becoming cripples, and as we were at a loss to understand the trouble we wrote to you, and you sent up one of your vets., and he slaughtered one of the animals and declared that soft bone was our trouble. We acted on your suggestion to try licks, but had very indifferent results, because the bad ones would not look at licks, until about eighteen months ago. There was a splendid article on “How they were overcoming ‘Soft bone’ in South Africa,” which was published in the ‘Queensland Agricultural Journal.’ This article stood out on its own, and has saved me pounds. The year previous to reading this article I sold twenty-eight cows and heifers on first calf because they were that bad with soft bone they were useless in the yard. Since then I have not had a trouble simply because I have put up to half a cup of bonemeal to each cow at each feed of chaffed cane. I have given up to a cupfull a feed to cows that had previously shown signs of soft bone. I found that the cows or heifers that are inclined to or have soft bone will not take to bonemeal if left in boxes as a lick.

If they would it would be splendid, as I am sure bonemeal will cure any beast no matter how badly affected in a very short time—up to six weeks. One farmer in our locality that had no means of feeding his cows, on reading that article (which I drew his attention to), tried to induce three heifers that were getting cripply to take to the bonemeal, but failed, and in place of putting the bonemeal (as suggested in the article) on their tongues he conceived the idea of mixing it with water, and gave them their dose as a drench out of a bottle, and got them right. I am satisfied that if you can get up to $\frac{1}{2}$ lb. regularly into your cows per week soft bone will disappear on the worst affected farms. I would like to say that our coastal scrubs, when they were new burns, kept our cows in great order, but as years go by they evidently get poorer in quality and the grass fails to keep up the supply of phosphates, and this thing is going to get worse. In my opinion the dairy farmers will simply have to give them phosphates in some form or other, and bonemeal seems to me the easiest and quickest way of doing it. I tried mixing molasses and bonemeal, and gave them free access to it. But there were too many gluttons about, and some of them would take a regular feed of the mixture. I found that if a cow was turned out of the yard she invariably got right in a short time with or without feeding bonemeal; this applied particularly to heifers. The better the heifer the sooner she fell to soft bone. But to carry out this form of cure you would soon have no cows in the yard.

Production in the Commonwealth.

The Commonwealth production statistics for the year 1924-25, prepared by the Commonwealth Statistician and Actuary (Mr. Chas. H. Wickens), contains particulars respecting the various primary and secondary industries. Of the total area of Australia 173,621,854 acres, or about 9 per cent., have been either alienated or are in process of alienation, and 915,302,610 acres, or 48 per cent., are held under lease or license, leaving a balance of 814,807,776 acres, or 43 per cent., still in the hands of the Crown. The area under crop in Australia during 1924-25 totalled 17,278,191 acres, an increase of 750,000 acres on the previous year, while the value of the produce amounted to £107,096,393, or an average of £6 4s. per acre. Wheat is the principal feature of Australian agriculture, and 11,859,000 acres—or nearly 69 per cent. of the total area under crop—were devoted thereto during 1924-25, of which rather more than 1,000,000 acres were cut for hay. Other main crops in the order of acreage were hay, oats, green forage, maize, fruit, sugar-cane, barley, potatoes, and vines. The favourable climatic conditions coupled with the high price of wool, were responsible for large sheep gains in 1924. The number returned, 93,154,953, represented the greatest total recorded since 1894. The wool clip was correspondingly increased, and 729,242,550 lb. were produced for a record value of £76,020,000. Economic factors prevented any gains in the numbers of cattle and horses depastured, but pigs increased to 980,009 during the year. The value of all pastoral products amounted to £121,891,000, composed as follows:—Wool, £76,020,000; meat, £30,319,000; skins, £10,673,000; other products, £4,879,000. Reflecting the bounteous season the dairying industry progressed considerably during the year. The value of dairy production amounted to £45,189,543, of which butter contributed £20,485,521. Permanent employment was provided for 451,813 persons in the agricultural, pastoral, and dairying industries, and the value of the implements and machinery used in these occupations was estimated at £41,000,000. The value of the production amounted to £274,177,000, of which £14,170,000 was shipped overseas. The total value of all minerals produced increased from £22,232,000 in 1923 to £24,646,000 in 1924. The number of establishments engaged in manufacturing during the year was 20,795, employing 439,949 persons, and paying in salaries and wages £81,360,021. Raw materials to the value of £221,993,978 were used in factories, and the value of the output was £380,843,986. The amount added in the process of manufacture or the creation of new wealth by the manufacturing industries was £147,136,758, or £334 per employee. Capital invested in land, buildings, plant, and machinery represented a value of £200,484,807. The total value of the production of all recorded industries in Australia during 1924-25 amounted to £449,157,000, or an average of £76 9s. 5d. per head of population.

Bacteria in Milk—Measures for Prevention.

Bacteria may enter milk in several ways. Large numbers may be in the lower part of the teat, and these are usually associated with cow-dung, dirty water, &c., and are very harmful. Other sources are dirt from the cow's udder and sides, the milker's hands and clothes, unclean buckets, dirty or dusty yards and bails, flies, unclean straining cloths, separators, separating or cream-room surroundings, and unclean cream cans.

The first source of contamination in healthy cows is in the teat; it is therefore advisable to discard the first milk from each teat, which in any case is not rich in fat.

Cows' udders and flanks should be brushed, if dirty, and then wiped with a wet cloth. This has the effect of firstly removing any dirt, and the damping prevents a large amount of dust, &c., from falling into the bucket.

Milkers' hands should be washed after the milking of each cow. This prevents dirt accumulating on the hands, minimises the danger of carrying disease from one cow to another, and also lessens the chance of milkers getting sore hands. Water containing a little formalin should be used for this purpose.

Clean buckets are buckets that are free from all bacterial life, and have been properly cleaned and scalded since last using. The slightest trace of any dried milk or grease means that considerable bacterial life is present, usually of a harmful nature, and these bacteria will be in a position to start growing the moment they come in contact with the milk.

DO NOT LET MANURE ACCUMULATE.

The bacteria which live in dung, &c., are particularly objectionable in milk, and among them are found most of the organisms which cause fermentation; therefore, the freer the yards and bails are kept of manure, the less chance of infection from this source, as the smallest breeze will lift the dust and deposit numbers of bacteria in the milk. A lot of infection from this source can be prevented by keeping all cans covered and on the windward side of the bails, remembering also that the milk must be kept free from the contaminating smell of all animal excretion. If water is available the bails and yards can be washed down after each milking; contamination from this source will then be practically nil.

Although nobody would argue against straining milk, nevertheless, if the operation is not done properly, it may itself be the cause of much trouble. An efficient strainer should remove as much foreign matter as possible from the milk, it should be large enough, and it should be easy to clean. With regard to cleaning, all strainers should be free from grooves, &c., which might collect milk, and it is more satisfactory if the gauze can be removed for washing. If cloths are used it is absolutely essential that these be washed, boiled, and dried after each milking, otherwise they are often a bad source of infection. If any large lumps of dirt, &c., are noticed in the strainer, these should be washed out before the next milk is put through, as otherwise they may become dissolved, and the bacteria they contain will be washed through into the milk.

DANGER FROM THE SEPARATOR.

An unclean separator or a separator which is not washed after each using is a very bad source of infection, because the infection will consist of live, virile organisms. As the modern separator is so easily cleaned, and in the majority of cases free from any corners, &c., and can all be boiled after use, it should be the last cause of trouble.

The separating or cream room should be so constructed that the floor drains quickly, and both the floor and at least some distance up the walls are quite impervious to moisture. It should be free from any acute corners, so that it can be easily flushed out each day with boiling water. Very many troubles in milk and cream which is otherwise well looked after can be traced to bacteria breeding in cracks in floors and walls, &c., of separating and cream rooms. Good ventilation is essential in cream rooms. No wet bags or cloths should be allowed to remain about, as they are a harbour for mould growths, &c. The room should also be guarded against any infection from pigs, fowls, ducks, dogs, &c.

CONTAMINATION FROM CANS.

In many cases the cream cans are a very bad source of contamination, and care should be taken that only rustless and seamless cans are used, and that they are thoroughly washed and scalded with *boiling* water and allowed to cool and thoroughly drain before any cream is put into them. Petrol tins, which are often used for storing cream, are a very grave source of infection, chiefly on account of the cream which collects in the seams. This trouble can be minimised by having the seams filled with solder before using but a tinned steel seamless bucket or can is preferable.

Orchard Notes for December.

THE COASTAL DISTRICTS.

The planting of pineapples and bananas may be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weed of all kinds, specially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Cannery only want first-class pines of a size that will fill a can, and cannot utilise small or inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying or cyaniding for scale insects should be carried out where necessary. Spraying with fungicides should be done where the trees show the need of it. A close lookout must be kept for the first indications of "maori," and as soon as it is discovered the trees should either be dusted with dry sulphur or sprayed with the lime-sulphur, potassium, or sodium sulphide washes. Borer should be looked for and destroyed whenever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and melons will be in season during the month. See that they are properly handled. Look out for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Keep leaf-eating insects of all kinds in check by spraying the plants on which they feed with arsenate of lead.

Look out for Irish blight in potatoes and tomatoes, and mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for the former, and finely ground sulphur or a sulphide spray for the latter.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Early ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, "Early ripe, early rotten," applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted, and there is no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground

for fruit fly and codlin moth, as well as of fungi, such as those producing the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled, and packed with great care, and nothing but choice fruit sent to market. If this is done, a good price will be secured, but if the whole crop—good, bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture necessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codlin moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot or downy mildew, or sulphured for oidium. Where brown rot makes its appearance, spraying with the potassium or sodium sulphide washes should be carried out. Leaf-eating insects of all kinds can be kept in check by spraying with arsenate of lead.

Vegetables will require constant attention in the Granite Belt area. Tomatoes and potatoes will require to be carefully watched in order to prevent loss from Irish blight, and no time should be lost in spraying these crops should this disease make its appearance in any part of the district, as it can be prevented by spraying with either Bordeaux or Burgundy mixture. These fungicides effectually protect the plants to which they are applied if used in time. If leaf-eating insects, such as beetles, grasshoppers, and caterpillars, are doing damage as well, add 3 or 4 lb. of arsenate of lead to the 100 gallons of spraying mixture used for the prevention of early and late blight (potato macrosporium and Irish blight), so that the one application will be effectual for both classes of diseases.

Keep all kinds of vegetables well worked, stirring the land frequently to retain moisture, and taking care to prevent the formation of a surface crust should rain fall. Remember that vegetables require plenty of moisture; therefore leave nothing to chance, but do your best to retain all the moisture in the soil you possibly can.

Farm and Garden Notes for December.

Although November is regarded generally as the best period for planting the main maize crop, on account of the tasselling period harmonising later on with the summer rains, December planting may be carried out in districts where early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of silage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resistant. When plants are to be used as fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state, consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner indicated, and fed in conjunction with green maize, or sorghum, when in head, in the

proportion of one-third of the former to two-thirds of the latter, a well balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary; otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered; otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked layer beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

ACALYPHA AS A FODDER SHRUB.

Mr. H. A. A. Dawson, of Mount Christian (N.C. Line), writes:—"I enclose a twig of a bush which horses eat ravenously; in a few days after it is eaten down it is covered with new shoots. When a branch is bent down to the ground it takes root readily, and also strikes from cuttings."

The specimen sent proved to be a species of *Acalypha* (*Acalypha Godseffiana*), a native of the Pacific. *Acalyphas* are widely grown as ornamental leaved shrubs in coastal Queensland and tropical and sub-tropical countries generally. A *Godseffiana* is the species in which the leaves are green, edged all round with a white border. Another very common species is *Acalypha marginata*, in which the leaves are brownish, edged with white or red. The plants are readily propagated by cuttings during the later spring and early summer months.—C. T. WHITE, Government Botanist.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

1926.	NOVEMBER.		DECEMBER.		NOV.	DEC.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	5.3	6.9	4.50	6.32	2.42	2.16
2	5.2	6.10	4.50	6.32	3.14	2.47
3	5.1	6.11	4.50	6.33	3.45	3.21
4	5.0	6.11	4.50	6.34	4.17	3.54
5	5.0	6.12	4.50	6.35	4.49	4.40
6	4.59	6.13	4.50	6.35	5.24	5.26
7	4.58	6.13	4.50	6.36	6.2	6.18
8	4.57	6.14	4.50	6.37	6.43	7.16
9	4.57	6.15	4.50	6.37	7.31	8.16
10	4.56	6.15	4.51	6.38	8.25	9.21
11	4.56	6.16	4.51	6.39	9.23	10.25
12	4.55	6.17	4.51	6.40	10.24	11.29
13	4.55	6.18	4.51	6.40	11.28	12.32
14	4.54	6.18	4.52	6.41	12.33	1.33
15	4.54	6.19	4.52	6.41	1.37	2.35
16	4.53	6.20	4.52	6.42	2.40	3.37
17	4.53	6.21	4.52	6.43	3.45	4.41
18	4.53	6.21	4.53	6.43	4.48	5.53
19	4.52	6.22	4.53	6.44	5.52	6.43
20	4.52	6.23	4.54	6.44	6.57	7.40
21	4.51	6.24	4.54	6.45	7.59	8.33
22	4.51	6.25	4.55	6.46	8.58	9.20
23	4.51	6.26	4.55	6.46	9.53	10.1
24	4.51	6.27	4.56	6.47	10.44	10.38
25	4.51	6.28	4.56	6.47	11.28	11.13
26	4.50	6.29	4.57	6.47	nil	11.45
27	4.50	6.29	4.57	6.48	12.6	nil
28	4.50	6.30	4.58	6.48	12.42	12.15
29	4.50	6.31	4.59	6.48	1.14	12.47
30	4.50	6.31	5.0	6.49	1.46	1.19
31	...	...	5.0	6.49	...	1.54

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

6 November ● New Moon 12 34 a.m.
 13 „ ☾ First Quarter 9 1 a.m.
 20 „ ○ Full Moon 2 22 a.m.
 27 „ ☾ Last Quarter 5 15 p.m.

Mars will be in opposition to the Sun on 4th November—that is, on the opposite side of the sky—in the east when the sun is setting, in the west when it is rising, and in a favourable position for observation. Mercury will be at its greatest elongation, 23 degrees east, on the 5th—that is, about 23 degrees below the horizon when the Sun rises, and about the same distance when it sets; it is therefore in a favourable position for observation on or near that date. It will rapidly draw nearer to the Sun, which it will pass on the 20th, becoming of course invisible.

Venus will be in superior conjunction on the 21st—that is, in that part of its orbit which is almost directly behind the Sun; it will therefore be invisible during this month. Saturn will also be in conjunction with the Sun on this date—that is, almost in a direct line behind it. Mercury will be in conjunction with Venus on the 25th, therefore there will be an apparent grouping of these three planets near the sun on or near that date.

The Moon will pass over and occult Epsilon Tauri on the 20th, a little before 9 p.m.

Zeta Tauri, another star of Taurus, will be occulted between 1 and 2 o'clock in the morning on the 22nd. These can be observed throughout Queensland.

An occultation of Eta Leonis will occur on the 27th in the north-west, about 3 a.m., lasting about twelve minutes.

5 December ● New Moon 4 11 p.m.
 12 „ ☾ First Quarter 4 47 p.m.
 19 „ ○ Full Moon 4 7 p.m.
 27 „ ☾ Last Quarter 2 59 p.m.

Jupiter will be in conjunction with the Moon on 10th December, at 5.4 p.m.; both will be visible in the west after sunset.

Mercury will be at its greatest elongation, 21 degrees 13 minutes west, on the 14th, and will therefore be visible in the eastern sky before sunrise, with Saturn apparently in remarkably close proximity.

Mars will be in conjunction with the moon at 6.18 p.m. on the 15th, and when visible soon after sunset will be rather more than the length of the Southern Cross from the Moon.

The Sun will arrive at its greatest declination south about half an hour after midnight on 22nd December, when the Australian summer solstice will occur. On and near this date, at midday, it will be noticeable that the Sun will cast the least amount of shadow of any time during the year.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

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PART 6.

Event and Comment.

Banana Growing in the North—Departmental Encouragement.

“There are indications of a revival of banana growing in Northern Queensland, which, I consider, are worthy of every encouragement, and so that the industry may be developed on proper lines, it has been arranged that there shall be conducted at the various sugar experiment stations in Queensland a series of experiments in connection with banana growing.”

This opinion and the announcement of this decision were given to the Press by the Minister for Agriculture and Stock (Hon. W. Forgan Smith), recently when he declared that the industry of banana growing was worthy of increased attention.

In former years, said he, the industry was carried on in a fairly large way in the Northern Rivers district of New South Wales, but owing to the incidence of bunchy top in the plantations there the production of bananas had materially decreased in the sister State. The banana was now primarily grown in Southern Queensland, but, in former years, the far North was the chief producer of the fruit in this State, and now there were indications of a revival of banana growing in Northern Queensland.

In the experiments to which reference had been made the several varieties of bananas would be tried out with the view of determining which produced the largest yields and the best quality fruit, as well as which would stand most satisfactorily the stress of transit conditions from the plantations to market.

There were indications that under-size fruit was attributable to lack of soil nutrition or to indifferent methods of cultivation and the care of the plant generally. The experiments would aim at definitely deciding this point. Consideration would also be given to the advisability or otherwise of introducing additional varieties from overseas. The tests to be carried out on the sugar experiment stations would be limited in area, and the costs in connection therewith would be borne by the department and would not be made a charge on the funds of the experimental stations.

Fruit Marketing Organisation Act—Continuance in Operation.

The Minister for Agriculture, Hon. W. Forgan Smith, has informed the Press that on the 15th November a petition was presented to him asking for the taking of a ballot on the question of the continuance or otherwise of the Fruit Marketing Organisation Act. When this Act was first passed in 1923, a clause was inserted to the effect that the Act should continue in force for a period of three years from the date of its coming into operation, and should be continued thereafter by Order in Council for a further period of three years unless, on the requisition of 500 registered fruit-growers, a ballot on the question of continuance be demanded, and on the taking of such a ballot a majority of registered fruit-growers demand discontinuance. In anticipation of such a requisition the Minister stated that at his instigation regulations were promulgated in the "Government Gazette" of the 16th October, 1926, providing the necessary machinery for the ballot, and in these regulations it was stipulated that the necessary requisition signed by 500 registered fruit-growers had to be handed in on or before the 15th November, 1926. At the same time, provision was made whereby any fruitgrower (not already automatically registered by reason of his being a member of a local association) could effect registration by applying direct to the department. A petition was handed in on the 15th November, but it was not formal inasmuch as it was not signed by the full number of 500 registered fruit-growers. Certain persons acting for the petitioners were informed of this fact and told that they would, so far as the Minister could do so, be given an opportunity of rectifying matters. Three weeks had elapsed since the date when the petition had to be filed and only about ten out of the seventy-five unregistered signatories had become registered in that time. As the ballot should in the ordinary course be completed before the end of the year, it is not now practicable to give further time for signatories to register, as such a course would not permit of the ballot-papers being sent out and returned before the end of the year. Under the circumstances, the Minister stated that he had no other course open to him but to rule the petition as out of order. The Fruit Marketing Organisation Act will therefore operate for a further period of three years, and the fact that growers did not lodge a formal petition indicates that the majority of growers are satisfied that the Committee of Direction is performing useful service on their behalf.

Radio and Rain.

Does the widespread operation of wireless bring drought? This startling question (says the "Brisbane Courier" in a recent issue), which, as the French put it, "gives to think furiously," emerges from a discussion raging recently in both England and France as to whether wireless was the cause of the unprecedented rains and chilly conditions that persisted so unseasonably in both countries during last April, May, June, and July; and which, it is to be noticed, have marked almost every year during those months ever since 1914. During the war it was freely asserted that the unparalleled cannonades from Switzerland to the sea, and elsewhere, were the cause of the freakish precipitations over parts of Europe; but when the Armistice ended the fury of the guns the weather did not improve to any very marked extent. All the scientists and meteorologists spent time and grey matter trying to trace the alleged cause and effect; but all equally were at a loss. Then M. Painleve, afterwards Premier of France, who had filled the post of Minister for War during the great struggle, advanced the theory that the Hertzian waves were responsible. Wireless, of course, had continued and increased, and has gone on increasing, since the cannon fell silent; so "there seemed to be something in it," says "Engineering." He called attention to the fact that the introduction of Hertzian waves into a tightly closed room, where the air is absolutely transparent, causes little drops of water to form on the faces of those present in the room. He explained that the

Hertzian fog found in every home had become ionized and electrified, thus forming rain. Of course this roused a regular storm of assertion and counter-assertion; some of the authorities declared that, so far from wireless waves causing moisture to be precipitated, they caused it to dissipate, or, rather, prevented it from forming. As our conditions are antipodal, the odds are that what causes dryness in Europe will cause wetness here, and vice versa. Perhaps this explains the dry conditions we are not enjoying.

The Country Women's Association—A Year of Progress.

The year's work of the Queensland Country Women's Association was reviewed at the annual meeting of the council in Brisbane in the course of the month, and showed the rapid strides the association is making. "The progress of the association is the best evidence of the appreciation of the women," said the Premier (Hon. W. McCormack), who occupied the chair. Of more than two hundred branches only two or three had gone into recess until times should improve, and the work of the association had gone steadily forward, the membership increasing during the year from 7,000 to nearly 11,000. The branches increased in number from 145 to 220. The report of the secretary (Miss J. White) stated as evidence of the progress of the association that each division had found it necessary to establish a paid secretary and office at its headquarters. Rest tents, rest rooms, emergency funds, and travellers' aid committees were important branches of the work, and the monthly meetings, lectures, and demonstrations, and the social gatherings also were important activities. At Christmas time practically every branch provided pleasure for the children in the district, and gifts were sent to the hospitals. Libraries had been opened in places where there were no School of Arts, and in some places recreation grounds had been provided for children. Interest had been promoted in municipal and community life. Educational facilities in the country had been given special attention, and interest has been shown in hospitals, ambulances, first aid classes, and all matters concerning public health.

The several deputations to the Government had always been courteously received and their requests given careful and sympathetic consideration; and although all requests were not granted there was a very important one, namely, that for travelling dental clinics, that had been successful. Several gifts of suitable land had been made for rest rooms and seaside homes. It was the obstacle of finance that had precluded some of the requests for improvement in educational matters being granted.

Country Women's Clubs—The American System.

After carefully investigating the methods of the Farm Bureau movement in America, Mr. David Kelly, of Parkes, New South Wales, who recently returned to Australia, reported to the advisory council of the New South Wales Agricultural Bureau that the New South Wales Government would be well advised to proceed to develop the bureau movement, and the appointment of district instructors, as more likely to give general satisfaction to the various agricultural interests. Although Mr. Kelly preferred Australian methods in bureau matters, he says that very satisfactory results have been achieved in many American counties as a result of the establishment of women's clubs in rural areas. These clubs operate similarly to the Agricultural Bureau. Small communities of farmers' wives and daughters (ten or twelve would be sufficient) form themselves into a club and agree to meet in each others' homes fortnightly. The programme of meeting places is arranged alphabetically, so that every home is visited. The hostess for the day provides the refreshments, and the utensils, which belong to the club, are moved to each place as required. The objects of the clubs are to increase the social intercourse, to encourage mutual improvement, and to discuss all matters relating to women's welfare. This system differs vitally from the Country Women's Association, in that the American women make their own homes the place of meeting, whereas the Country Women's Association here has a common meeting place in the towns. Our method results in the gathering together of a fine body of the leading women of the district, who do excellent public service, but the American club system is perhaps more effective in getting in touch with the more isolated homes, which have the greater need of social assistance, and it also helps to develop local leadership and local organisation, with apparently very happy results.

Bureau of Sugar Experiment Stations.

CROP PROSPECTS.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, has returned from an official visit to the sugar areas of Bundaberg, Mackay, Herbert River, Tully, Johnstone River, Babinda, and Cairns. At Bundaberg, which was seen on the way north in October and again on the return journey this month, very little rain had fallen, and the whole country was exceedingly dry—no green grass to be seen anywhere. The cane crop had not made the growth expected earlier in the year, and the estimates formed had been much reduced. At Childers the crushing was a very small one, practically only a quarter crop. A little rain fell at Bundaberg in October, but not enough to do any good. It is surprising to find the young ratoon cane looking so well as it does, but as yet it has not made much demand on the soil. The early plant cane is suffering, and rain is now most urgently required, not only for the cane but for stock, pastures, and waterholes.

At Mackay good rains had fallen in September, and about the middle of October the whole area presented a fine appearance; the cane crops had improved, and the country generally was green. The mills were working smoothly, and the earlier estimates were being for the most part realised. On the other side of the ledger in the prolonged dry spell quite a lot of cane had suffered, and much damage had resulted from frosts in several subdistricts. On returning to Mackay four weeks later, in November, the good effects of the rains had disappeared. Everything was exceedingly dry again, the rich green appearance of the grass had been lost, and the country was rapidly assuming a dry brown look. The young cane, however, on well-cultivated land looked well, and the plantings for next year had been good. The total mill estimate had been slightly reduced, and it was now anticipated that the total production for the Mackay district would be 69,000 tons of raw sugar in place of 73,000 tons estimated in July.

The Farleigh mill, which was taken over by the farmers from a private company this year, was reported to be doing good work, between 4,000 and 5,000 tons of cane being put through weekly. This mill did not commence crushing till 8th September, following a very complete overhaul. The commercial cane sugar in the cane, the extraction, and efficiency have all been good. Owing to the large crop a good deal of the Homebush cane was being sent to Marian and other mills. This mill expects to finish early in January.

The Marian mill, which had installed a complete new crushing plant and other additions, now contemplates further improvements in the shape of a quadruple effect, new chimney stack of steel 100 feet high by 8 feet in diameter, fan and engine for induced draught, one 15-foot subsider, new fugals, large fugal engine, Thomson-Wolverhampton boiler of 6,050 feet heating surface, which will make 25,000 in all. This mill at present is putting through over 5,000 tons weekly, the average commercial cane sugar in the cane being 13.75 per cent.

The Plane Creek mill had crushed 86,200 tons of cane up till the 14th November at the rate of about 5,400 tons a week. A new 6-foot by 35-inch crushing mill is to be installed next season. This will much improve the extraction. A very fine solid weir has been erected across Plane Creek, by which 20,000,000 gallons of water are held, which will ensure a remarkably fine supply of water for milling and distillation plants. The new power alcohol distillery is well under way, but delays in delivery of steel have caused the work to be not so well forward as was anticipated. It is now considered that it will be March of next year before operations are commenced. Two enormous molasses tanks have been completed—one to hold 450,000 gallons, and the other 750,000 gallons. The building will be a fine one, equipped with the most modern distilling appliances.

A good deal of Red Rot is present in the cane areas, particularly in M. 189, 1900 Seedling, and Malagache. Farmers are cautioned to destroy all stools showing this disease by ploughing out same and planting up with more resistant canes, such as Q. 813. Advice on the matter can always be obtained from the Bureau of Sugar Experiment Stations, Brisbane.

The rainfall at Mackay this year has been very low, only 26.52 inches being recorded at the Mackay Sugar Experiment Station up till the end of October. No satisfactory year's rainfall has been experienced since 1921.

The Herbert River district had also suffered greatly from the long continued dry weather, and although abnormal rains (up to 16 inches) were experienced in September, it did not have the effect of increasing the crop very much, the two mills expecting a smaller tonnage than was estimated early in the year and considerably less than last year. Another factor which tended to reduce both the crops and the quality thereof was severe frost. It is estimated that 1,500 acres of the cane supplying the Victoria mill was damaged this year. This coming on top of the severe drought caused much loss. It is very exceptional for the Herbert River district to experience frosts of so severe a nature. The Long Pocket and Fairford cane presented a fair appearance, but more rain is required. The company have extended the 2-foot line into Lannercost. Seedling raising is taking place at the Macknade Nursery, but comparatively few have been raised so far.

Operations at the fine new mill on the Tully have been considerably hampered by strikes, the mill supply being disorganised for over three weeks, due to cutters wanting green prices for burnt cane. This strike was apparently settled on 29th October, but it broke out again on 1st November, when it was again settled. This strike was most unfortunate for farmers who were just beginning canegrowing and who were looking forward to a good run this year to reimburse their expenditure. The mill was doing fine work, but much difficulty was found as the result of men drifting away during the interruption, which meant the training of another lot of inexperienced men.

The average rainfall on the Tully for the last eight years has been 142.04 inches, somewhat less than Innisfail.

The country around Innisfail had also experienced remarkable rains in September, up to 18 inches having been registered in parts. This had given a great impetus to the young cane, which on the whole was looking exceptionally well and forward. The dry weather which has prevailed since then, however, has considerably dried up the grass, and further rains would now be welcome. A large amount of Leaf Scald disease is present about Innisfail, and farmers should act with great care in planting. The circulars sent out by the Bureau on this disease should be studied. The Colonial Sugar Refining Company has also recently issued a bulletin on the subject.

Banana-growing is increasing, and hopes are expressed that this industry will soon play a very important part in the further development of North Queensland and prove of considerable benefit to the sugar industry by affording another use for scrub lands. Professor Goddard, who is taking a keen interest in this matter, is of opinion that the lands are eminently suitable for bananas, and that a great industry can be built up.

The three mills at Innisfail were getting rapidly through their large crops. Estimates have improved in this locality due to the fine September rains.

At Babinda the grub damage had been light this season. The young cane was looking well, and a large crop is being crushed. The estimate has increased by 20,000 tons of cane from that furnished in July. About the usual area has been planted for next season. The mill is working well and with satisfactory results.

Hambledon and Gordonvale were dry during October; the rainfall had not been so great as at Babinda and Innisfail. The crops being handled by Hambledon and Mulgrave were larger than anticipated earlier in the year. Mulgrave's crushing a week or two ago exceeded 7,000 tons for the week, while the commercial cane sugar was about 15 per cent.

The cane at the three Experiment Stations has now all been harvested, and preparations for next year's work are well forward. The Entomological Laboratory was also visited.

SUMMARY.

The approximate estimate has improved to some extent, and is now close on 3,000,000 tons of cane. An estimate of the yield of raw sugar will be furnished shortly.

All the estimates north of the Herbert River have gone up, while nearly every mill from the Herbert south has decreased its figures. This is always the case in times of drought, and tends to emphasise the special fitness of North Queensland for canegrowing, as in dry periods their yield is almost always better than in very wet years, while droughts (as such) are unknown. For instance, the Tully area, in spite of so-called dry weather, has experienced a rainfall of 87 inches to October of this year.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has made available the following report (1st November, 1926), from Mr. E. Jarvis, the Entomologist at Meringa:—

During the last four years we have experienced what may be described as prolonged drought conditions, which have to some extent interfered with field experiments. Instead of the average annual rainfall of about 90 inches, our records at Meringa Laboratory during this period have varied from about 42 to 73 inches per annum; our total precipitation for these four years (1922-25) having been, collectively, 251.53 inches, as against the average for that period of 360 inches.

Such climatic conditions, however, although hindering cultivation and normal growth of the cane, have exercised at the same time a very desirable check on the increase of the beetle pest, thus affording no slight compensation to those growers who have the misfortune to suffer very materially during normal seasons from the ravages of cane grubs.

It is satisfactory to note that our principal cane beetle has again received a decided set back, before able to rally from a previous severe check sustained during the three years 1922 to 1924.

Climatological Control of Greyback Cockchafer.

It is very interesting to trace the manner in which this exceedingly valuable repression of so formidable a pest has been at present accomplished by the simple operation of natural factors of a meteorological character.

Such climatic control usually results from more or less prolonged drought conditions, the degree of efficiency attained being, in the case of our cane beetle, dependent upon the time of year and duration of the period over which such influence is exercised.

Apparently the most important phase in the life-cycle of this insect—looked at from an economic standpoint—is that of its pupal condition, which happens to be passed underground in an oval chamber formed by the grub at depths varying from six to fifteen inches or more. Although occupying a position so well calculated to exclude possibility of attack from predaceous insect or other enemies, these cockchafers, after transformation to the imago state about six weeks later, find themselves practically imprisoned in their subterranean cells, from which escape is impossible until the surrounding hard dry soil shall have become sufficiently softened by heavy rains to allow them to tunnel upwards and reach the surface.

Now, it is all important that just before and for some time after pupation of the grubs of this insect in June or July, the rainfall should continue normal throughout a period of five months—viz., June to October—in order that such transformation may take place at the proper depth, and the soil remain moist until commencement of the fighting season.

Should abnormally dry conditions prevail during these months, coupled by a precipitation far below the average throughout the preceding period of January to May, a check to the activities of this species must assuredly follow.

In the event, however, of such climatic conditions being continued through November and December, the check sustained is generally of great severity, and enormous numbers of these beetles must inevitably perish hopelessly in their underground pupal chambers.

Glancing back a few years we find that the last decided outbreak of this pest occurred in 1921, when the annual rainfall was no less than 124.50 inches, being, in fact, 34.50 inches above the average.

This gave the enemy a chance to recover from slight climatological checks experienced during 1918 to 1920, and had the precipitation in 1922 been normal they might again have appeared in sufficient force to have occasioned very serious damage.

Fortunately the annual rainfall in 1922 happened to be 26.70 inches below the average, and instead of getting 9.87 inches during the critical period of June to October we recorded 7.52 inches. Such adverse conditions would alone have served to curtail the increase of this cockchafer; but being followed, as they were, by an exceptionally dry November and December, in which the rainfall was 10.85 inches below the average for these two months, the result was an additional set back of unusual severity.

In the year 1923 this species again received a blow, which falling on top of that experienced the preceding season (1922) reduced its numbers to comparatively harmless proportions. These desirable conditions having resulted from the rainfall

chancing to be 47.19 inches below the annual average, while the amount registered for the critical period of June to October was only 275 points, as against 9.87 inches, the usual average for these five months.

Although 1924 favoured the increase of *albohirtum*—the rainfall throughout June to October being only 1.65 inches less than the average—its feeble attempts to regain ground were once more doomed to defeat during the following year (1925), when the annual precipitation fell again to 21.67 inches below normal, and instead of recording 9.87 inches during June to October, the rainfall at Meringa for this period was 4.99 inches. To make matters worse for this pest the fall during November and December collectively, happened to be 6.94 inches below the average.

The table given below indicates clearly the intensity of the various successive checks received by this cane beetle during the last four years. The most significant rainfalls are underlined, since these were chiefly instrumental in bringing about its control.

—	ANNUAL RAINFALL AT MERINGA LABORATORY.		NO. OF INCHES DURING JUNE TO OCTOBER.		NO. OF INCHES DURING NOVEMBER AND DECEMBER.		—	
	No. of inches recorded at Meringa Labora- tory.	No. of inches below average rainfall.	Rainfall at Meringa Labora- tory for June to October.	No. of inches below average for June to October.	Rainfall at Meringa Labora- tory for November and December.	No. of inches below average, November and December.	Average annual rainfall during the period of 1921 to 1925.	Decrease in average annual rainfall, 1921 to 1925.
1921 ..	124.40	..	19.91	..	13.06			
1922 ..	<u>64.70</u>	25.30	7.52	2.35	<u>2.70</u>			
1923 ..	<u>42.81</u>	47.19	<u>2.75</u>	7.12	6.63	6.29	457.50	83.47
1924 ..	73.69	16.31	8.22	1.65	17.56			
1925 ..	68.33	21.67	<u>4.99</u>	4.88	5.98	6.94		
	<u>374.03</u>				<u>45.30</u>			

With reference to the rainfall during January to August of 1926, and the possibility of its affecting the numerical increase of our greyback cane beetle, it is interesting to note that during this period of five months we have recorded 40.00 inches, which is 32.58 inches below the average amount.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (22nd November, 1926) from the Entomologist at Meringa, Mr. E. Jarvis:—

Importance of Artificial Control Methods.

Whilst in Victoria recently I made a point of visiting several chemical factories and other manufacturing works in order to obtain samples of various by-products, &c., of an insecticidal nature for future trial against cane grubs.

Some of these have given encouraging results in our laboratory, and appear deserving of further tests under practical field conditions.

A few additional patent insecticides have also been recently forwarded to this station from Brisbane and elsewhere, among which may be mentioned "Chlorocide B," "Qua-Sul," Sodium Sulpho Carbonate, Sulphur Mono-Chloride.

Such outside activity indicates perhaps, a fuller realisation amongst lay workers in this connection of the economic significance of entomological research work. At the present stage of the cane-grub problem, however, it seems to me that instead of endeavouring to find new remedies, it would be more advantageous to concentrate experimentation for the most part on the discovery of cheaper and more practical methods of applying such insecticides as may already have been found by experience to be thoroughly effective against the grubs of this cane beetle.

In these days, when the control of insect pests by means of introduced predaceous and parasitic natural enemies plays so important a part, and has in some cases

proved of such inestimable value, one is apt to regard other and less fascinating remedial methods as somewhat irksome and commonplace by comparison.

Growers would do well to remember that these latter forms of control are likely to continue to hold first place in the work of combating most of our insect pests, seeing that the results obtainable by the use, for example, of such artificial remedies as poison-baits against "Army worms," grasshoppers, &c., or of arsenical and other sprays for coping with plant-eating beetles, may generally be depended upon to yield beneficial results within a few hours after application; whereas, the help hoped for from the activities of some introduced parasite is at the best problematic, and one must be willing—after perhaps years of waiting—to accept ultimate failure. On the other hand, in the event of success crowning the efforts of the parasitologist the results secured in this way may be of incalculable monetary value to the world at large.

While in entire sympathy with, and fully realising the great economic importance of parasite control, I would at the same time advise our farmers not to neglect the practice of such artificial means of controlling their chief cane insects as are recommended from time to time in the monthly reports and "Entomological Hints" published by the Bureau of Sugar Experiment Stations in the "Queensland Agricultural Journal" and "Australian Sugar Journal."

Notes on Cane Butterflies.

Melanitis leda Linn. (Leaf Butterfly).—This butterfly was first recorded by the writer as being harmful to the foliage of cane in June, 1916, at which time both its eggs and larvæ occurred in fair numbers on young cane plants at Meringa.

Subsequently, both forms of the Australian race of this widely distributed insect—viz., *Melanitis leda banksia* Fab. and *M. leda banksia* F. *barnardi* Lucas—were bred by the writer at Gordonvale from eggs deposited on leaves of sugar-cane.

During the last few years the caterpillars of this insect, although doubtless present in canefields, appear to have escaped notice, a few odd specimen only having been collected by us from time to time while searching for "Army worms," &c.

A very interesting infestation of this cane butterfly, however, was discovered last October at Saw Mill Pocket by the Assistant Entomologist, Mr. A. M. Burns, the caterpillars being present in great numbers and causing considerable damage to young cane plants. More than one hundred were collected for breeding at our laboratory, in order to study the various parasitic insects which control the increase of this butterfly.

Up to the present a species of Tachinid fly appears to be its chief enemy, the only other parasite obtained from these caterpillars being a species of braconid wasp. Amongst the large number of butterflies emerging from the pupæ only one specimen of the variety *banksia* was secured, all the others being examples of the form known as *barnardi*. This well-known butterfly, which measures about three inches across its expanded wings, is chocolate or red-brown on the upper surface, merging into dull orange on the forewings which are deeply scalloped on outer edges and ornamented with a conspicuous black eye-like blotch enclosing two large white spots.

The coloration of the lower surface in variety *banksia* varies from light to very dark purplish-brown, and is crossed by a few blackish lines resembling the veins of a leaf, the outer angles of the hind-wings being prolonged in the form of two short tails; while in *barnardi* both the upper and lower surfaces of the wings are of a lighter brown, ornamented with six to nine unequal sized blue or more often white-centred black spots, encircled by a yellowish ring edged with dark brown. These eye-like spots or ocelli are situated near the outer margin of the lower surface of the wings. The caterpillars of this butterfly can be easily distinguished from those of other lepidopterous species affecting cane owing to the presence of two long blackish horns arising vertically from each side of the head, and by its tail extremity being prolonged horizontally into two fleshy points. When fully grown it is about 1½ inches long, with body tapering gradually towards each end.

Parnara mathias Fab. ("Large Skipper" Butterfly).—This common hesperid has a wide range of flight, extending from Port Darwin to Brisbane, and occurs also on the leaves of sugar-cane in other countries. It was first recorded as affecting cane in Queensland during 1914, when caterpillars of this insect were observed by Mr. A. P. Dodd damaging the foliage of sugar-cane at Harvey's Creek. The larva is pale sea-green with three faint but darker green dorsal stripes, the sub-dorsal ones edged below with light yellow. Anal segment pale bluish-green, extremity of dorsal portion semi-circular and edged with white hairs. Like other closely related species of Hesperidæ the caterpillar feeds under cover, drawing together the edges

of a leaf-blade near the point of same in such manner as to form an almost cylindrical tube, in which, being effectually hidden, it is comparatively safe from attacks of birds and other enemies. Specimens of this cane-skipper were found recently by Mr. A. N. Burns associated with caterpillars of *Melanitis leda* at Saw Mill Pocket.

Telicota Augias-kreffti McLeay ("Skipper Butterfly").—This species was also found at Saw Mill Pocket last month in company with larvæ of *M. leda*. Its habits are very similar to those of the preceding insect, from which it differs, however, in the form and coloration of the larval and pupal stages. A detailed account of the abovementioned cane butterflies will be found in Bulletin No. 3 of this Bureau, Div. of Entomology, pp. 22, 23, 24; and Bulletin No. 9, pp. 11 to 13. The only other butterflies recorded by us up to the present as injurious to cane are the two hesperids—*Padraona hypomoloma* Lower., and *Padraona marnas* Feld., the latter being our commonest species around Meringa and Gordonvale.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has made available the following report (20th November, 1926) from the Southern Assistant Entomologist, Mr. R. W. Mungomery:—

Wireworms.

Certain wireworms or larvæ of the family Elateridæ (Click beetles) have long been in disfavour in many localities on account of their notorious habit of attacking young plant cane, and the Pialba district is one in which these pests abound. Though they are credited with doing damage throughout the whole year, they cause the most concern just after the spring planting season, when the greatest portion of the cane is planted there. Therefore these Pialba farms and others in the surrounding districts of Nikenbah, &c., were visited in the early part of October, with a view to making certain observations and investigations on the habits of these wireworms. This year they have been troublesome only on a few farms, and elsewhere their damage has been more sporadic, thus rendering the carrying out of investigation work more difficult under these circumstances.

On looking superficially over a block of cane where wireworms are known to occur, much of their damage is not seen, for they attack newly planted sets soon after having been placed in the ground, and by eating out the eyes cause the failure of that set, although the roots may have developed from the nodes quite normally. The surest sign of their damage is the appearance of "dead hearts" amongst the young shoots of the young plant cane, but these may also be caused by such pests as the "black beetle" (*Pentodon australis*), mole cricket (*Gryllotalpa* sp.), and the moth borer (*Phragmatiphila truncata*), &c. Wireworm damage, however, can be distinguished from that of these other pests with similar habits by the sight of a small brown hole underground on the outside of the shoot, where the insect has commenced operations. This hole extends into the soft central tissues, constituting the growing portion of the shoot, and is always much smaller than any caused by the pests enumerated previously. If the hole be situated high up on the shoot, the lower portion sometimes keeps growing as usual, pushing the higher dead portion above it and out of the centre of the whorl, and in this way the plant suffers little check. When these central tissues are eaten through lower down on the shoot, all growth in that shoot stops, except that eyes are either developed at its base adjacent to the set, and from these new shoots appear, or on the other hand the set dies.

If a plant showing a "dead heart" with the above characteristics be examined, the investigator may not necessarily find a wireworm in close association with it, for in most cases after having pierced the shoot and fed for a few days on the softer portions, it travels along the row to succeeding sets, inflicting similar damage on these, until one sees several dead hearts in succession. Therefore the most opportune time to capture wireworms is when the central heart is showing the first signs of wilting, and to observe this, the most favourable period of the day is the early morning. This happens because the rays of the sun, striking obliquely, have not reached their maximum strength, neither have they had sufficient time to cause the young leaves to droop. Now a plant showing wireworm attack will have the outside leaves of the whorl quite fresh while the heart will be curled and commencing to shrivel, and it becomes quite easy after a little experience to differentiate between the two conditions. If this plant be uprooted a wireworm will usually be found close to the shoot or set. A few wireworms taken in this manner were brought back to the Bundaberg laboratory with the object of breeding them to the adult condition and noticing any peculiarities in their habits.

***Pentodon Australias*, the "Black Beetle" or "Set Eater."**

The occurrence of this beetle, its association with cane, its damage and the method of locating it, can be couched in similar language to that used in describing the wireworm above. Indeed, so much are they alike in their habits that several of these were taken while searching for wireworms in canefields in the Pinalba district. However, their damage differs slightly from that of the wireworm, and can readily be recognised by the characteristic appearance of torn and broken fibres of the outer leaves on the underground portion of the shoot. These broken fibres sometimes run straight up the shoot as far as the ground level, while at other times the fibres are torn in the form of a spiral. Also there is usually one large hole where the beetle has gnawed into the tender central portions of the shoot. The set itself often has holes eaten into it, as well as having the eyes eaten out, and at first sight it would appear that this was the work of a grub, but as a matter of fact the beetle itself is responsible for this damage. This was proved by caging beetles alone in a tin in which cane sets had been planted. A few weeks later, when examined, the sets had rooted, but all the eyes had been eaten out, and large irregular holes had been eaten through the hard rind into the central and softer fibres of the set.

Natural Methods Tending to Minimise their Effects.

Mention has previously been made concerning the apparent association of these pests (i.e., the wireworm and black beetle) with paspalum land, in which case growers would do well to keep down paspalum grass as much as possible. However, two very serious faults, and obvious ones, too, which tend to handicap farmers in their efforts against these pests are (1) insufficient cultivation and (2) the use of inferior plants.

(1) Paddocks intended for canegrowing are sometimes given two shallow ploughings, and then drilled out and planted, and it will be realised what a deplorable condition the soil is in. Clods of soil and lumps of paspalum grass serve as habitats for both of these pests, as well as having a tendency to make the plants stand on end when dropped from a planter, instead of normally lying flat in the drill.

(2) The use of inferior plants, however, is far more prevalent and is to be condemned. Small thin sets are very commonly used, and it is surprising to note the number of growers who have adopted this malpractice. The result is that when one shoot suffers attack there is not sufficient nutriment remaining in the set to send forth another shoot, and the set dies. It was quite the reverse on another farm which had suffered slight damage. This had been planted with good thick M. 1900 Seedling plants, and the ones that had been attacked were invariably sending out new shoots from the sides, and the effects of the wireworms would have been almost negligible, except perhaps in making the plant stool out a little prematurely.

With such positive results in favour of better plants, it is difficult to understand why farmers will continue with the penny wise and pound foolish method of using small thin sets. When approached on this score the only objection I had farmers raise against the use of longer sets with at least three eyes, was their alleged tendency to stand on end in the drills to which I have referred under (1), but surely with a better soil condition and the use of modern planters this difficulty could be overcome, and should prove no obstacle at all.

FIELD REPORTS.

The Southern Field Assistant (Mr. J. C. Murray) reports (19th November, 1926):—

Waterview.

The principal point the writer would like to impress on growers in this area is the immediate necessity of dealing with Mosaic disease. They are recommended to carefully select plants, and not plant maize near the cane. Some farms on this area are, at present showing almost 100 per cent. Mosaic attack.

In the last report a simple and effective method of plant selection was outlined. The writer recommends that no cane plants be taken from the Burnett River (Avoca downwards) until the Mosaic disease is more under control.

Oakwood.

Young plant and ratoon cane look fair, and if reasonable rains occur between now and Christmas there will be a good chance of a payable crop next year.

Cane varieties doing well in this locality are E.K. 28, Q. 813, M. 1900, and D. 1135. The first named is rapidly coming into favour, the growers finding it to be a cane of vigorous growth and high sugar content. The writer has been recommending more extensive planting of this cane for some years past. Growers are recommended to plant more green manure crops. It is most desirable, in belts that suffer from periods of dryness, that a good humus content should prevail in the soil.

Gin Gin.

The cane in this district is healthy on the whole. Details:—

Autumn plant—Good strikes, slow growth;

Spring plant—Fair strikes, slow growth;

Ratoons—Rather shy; but, on the whole, satisfactory; slow growth;

Standover—Healthy, what is left; no particular growth.

The black Maroondan soils are at present being farmed more efficiently than ever before. Farmers have excellent prospects of good crops next year. H.Q. 285, M. 1900 Seedling, and Q. 813 are the most favoured canes. D. 1135 is still largely grown.

Some disease was found in almost all varieties inspected in the Gin Gin areas; the only cane that the writer found apparently immune was Uba.

Nambour.

Some very good crops are being cut, particularly Q. 813. Only minor instances of loss through gumming are reported. The disease may never reach epidemic proportions as it did last year, if the growers maintain their present carefulness in plant selection. Q. 813 is proving very resistant, and is at present an entirely satisfactory cane for local conditions.

The Northern Field Assistant, Mr. A. P. Gibson, reports (8th November, 1926).

MOSSMAN.

Rainfall.

Only 40.27 inches had been recorded for the year; this is far below the mean. Canegrowing is now confined to the valleys or lower levels; years back it was raised high up on the hillsides of the nearby mountain ranges; to-day these slopes are thickly carpeted by a waving brown sea of matted blady grass. The high rugged mountain range is near the coast, and in consequence a splendid rainfall is generally assured. The cane areas generally have much broken ground, and intersected by numerous short, fast running fresh water creeks; such ground and creek banks grow vegetation of all kinds in profusion and are highly favourable harbourages for rats.

The Crop.

The 1926 area to harvest is a few hundred acres greater than that of last year. Timely rains have revived the crop wonderfully with the result that most of the paddocks harvested, more especially the plant cane, is cutting beyond expectations in quality and quantity. It is now considered that the early estimate will be realised. The whole crop is burned prior to harvesting; green rates for cutting burnt cane are being paid. It is not possible to judge with any degree of accuracy the exact quantity of cane to burn so that it can be removed before deterioration sets in, therefore overmuch is burned, and at times fires do get out of control; one farmer had the misfortune of having over 500 tons burned in this way. Rain fell soon after and it was not wholly treated for some seventeen days. Cane at all times does not reach the factory in a fresh condition because of the scattered farms. The speeding of cane to mill after burning or cutting is of great importance.

Harvesting is proceeding smoothly. Small gangs are mainly operating and the harvested cane loaded on to trucks and removed either on rails or truck waggons. The crop generally is good cutting.

The mill was to have started on the 11th June, but did not commence until 5th August, from the start the quality was excellent. September rains somewhat reduced the c.c.s. to 13.76, since, drier conditions have prevailed, and the mill average was advanced to 14 c.c.s. The cane being milled is of good length and composed of many varieties. Mill work has improved, in one week it crushed 5.053 tons, its greatest since its inception; last year 10,503 tons of sugar were manufactured, this

year it is expected that the record will easily be overshadowed. The sugar is sent to Port Douglas over the Shire Council's small gauge railroad, costing 14s. a ton, and removed to Cairns by some of the smaller freighters. The factory had crushed nearly 43,000 tons up to 9th October.

Soils.

Mossman soils for the greater part overlay an almost impervious stratum of clay, varying from 6 to 10 inches deep; it becomes cohesive when wet and refractory when dry, especially if left unworked at a critical time. It is greatly deficient in organic matter and lime; it is possible to restore the former by the growing and burning in of vegetable matter. Lime is indispensable for the healthy growth of plants, and it furnishes an important base which is helpful in the process of nitrification. The price of this here would be prohibitive for profitable use. There is a fine undeveloped deposit of lime in the area, which possibly would be a great asset if opened up.

Cultivation.

The new crop had not altogether received the necessary care and attention that it so much requires—some growers, the day long, are operating truck waggons, thus neglecting the 1927 crop. Weeds are quickly over-mastering some fields and the soil is losing its moisture and becoming refractory; such a condition could have been arrested by timely inter-tillage of cane rows. The prospects generally favour the planter who ratoons or cultivates the crop interspaces as soon as practicable. The weather is most favourable for weed killing, in consequence growers should be going their hardest mulching the interspaces and in every way striving to promote the growth of cane, thus encouraging its stooling and assisting to arrest moisture lost by capillary attraction.

Ratooning.

Many paddocks have not been cultivated since harvesting. The general practice is to throw away from the cane rows by ploughs and the crown or middles rolled or sledged even; when the ground is saturated and the cane small it is an advantage to leave such drills open, for they greatly assist in removing the surplus water; during dry periods these open furrows have opposite consequences and should be filled in thus reducing evaporation.

Planting.

Many paddocks could not be prepared for planting prior to the September rains, therefore this operation had been delayed and was being continued. It is too late for Badila planting, in fact the area, save in parts, cannot be classified as being very suitable for this kind. Varieties doing well and apparently suitable for the district are as follows:—Badila where land is suitable, D. 1135, Q. 813, E.K. 28, and B. 147. Unfortunately H.Q. 426 seems susceptible to all diseases, so that it is only a matter of time when it must become a prohibited cane.

Pests and Diseases.

Farmers should take more interest in the selection of disease free plants. Pests and diseases are increasing in parts of the North, and our great industry is endangered; some planters realise the position and are faithfully striving to eliminate them; others are undoing the good work. With patience and hearty co-operation destructive pests and diseases could in a large measure be controlled.

Rats are very bad and are badly injuring the crops, in parts; they eat through the stem anywhere and sometimes remove the eyes. The quality is seriously affected; higher harvesting rates must be paid, besides losses in weight. The writer thinks they are the medium by which diseases such as Leaf Scald and gum are carried, the organism responsible for the disease being transported from diseased to healthy cane and inoculated with the teeth. Saltwater growers have decided to give 1d. per ton of cane towards systematic rat poisoning.

Grubs and dry weather had killed small patches of cane, this being more noticeable on a porous red soil hillside farm at Cassowary, and here and there along the alluvial flats. Wireworms and tenebrionid moth borers were killing ratoon shoots.

Diseases.

Leaf Scald and Leaf Stripe are serious diseases in parts and continue to spread. Cane rust was found widespread on H.Q. 426 throughout the area, and one stool of Mosaic on the same variety. The prospect for the coming season is again hopeful, the ratoons and plant cane are looking well, but again wanting rain. Profitable sugar-growing and manufacturing in these parts is becoming a struggle.

TULLY.

Weather and Rainfall.

The Tully and Innisfail annual rainfall seem about equal; they fall short of that received at Babinda. One unusually high fall of 18.46 inches was recorded at Tully for September, this increased the year's total to 86.73 inches. Since then the weather has been hot and dry.

A great awakening has taken place since the completion of Queensland's newest mill and the North Coast railroad to Cairns. What was an inaccessible, unpopulated belt two years back, now carries an ever-increasing population which is speedily making accessible roads and converting virgin lands to promising cane farms.

The Crop.

Generally speaking this is most irregular, much of it is plant cane; it continued to grow steadily throughout the winter months and had not been seriously troubled by pests or diseases, therefore was yielding a crop of quality and one overshadowing early estimates.

Harvesting.

Cutting was not in progress when the area was inspected, but had continued uninterruptedly to the 11th October when a strike was declared. Operations were, however, resumed on the 29th October. The delay at a time when the weather was ideal and the cane quality possibly at its best was most unfortunate, and in consequence planters were greatly worried, for their future depended so much on the harvesting of this, their maiden crop.

The weekly capacity of the mill is being gradually raised; 77,000 tons had passed between the rollers to the end of October. This would have been 90,000 tons had there been no cessation of operations. Approximately 61,000 tons remain to be treated; some of this is very backward and probably will not be cut. On the face of things it would appear the factory cannot treat all the cane offering this year.

Cultivation.

Not much land is under the plough therefore little cultivation is practised. A big all-round improvement was noted in the field, much trash could not be burnt last month so it was rolled.

Varieties.

Badila (N.G. 15) has quickly made good in its new home. It is most unfortunate for the district that diseased canes are widespread, and it is only by the hearty co-operation of all interested that these can be eradicated. Where the land is suitable, Badila should be grown. Much of the Tully is too poor for this kind, therefore any of the following varieties—7 R. 428 (Pompey), Q. 813, E.K. 28, Korpi, Oramboo, D. 1135, and B. 147, can be recommended. H.Q. 426 and Goru family are too susceptible to disease and may soon have to be entirely eradicated.

Pests.

Army worms, rats, wallabies, white ants, and mound building ants were located. Fields having their interspaces covered by stacked cane, tops or trash have been most severely attacked by the army worm. A poison solution made from the following and sprayed on the cane leaves in advance of this pest has proved effective—3 lb. lead arsenate to 50 gallons water.

Rat destruction is increasing, here there are many fresh water creeks, the banks of which are quickly becoming grassed and are breeding places for this pest. The only way of safeguarding this area is by systematic poisoning right from the start.

The mound building ant is troubling growers tilling a coarse grainy land, where it is said they nip off the root system from the newly-planted sets.

Diseases.

Leaf Scald and Top Rot are common. The former is prevalent throughout the greater part of this area, but to a lesser degree in the Lower Tully. This disease had been extended to many of the newly planted areas; it is recommended to have affected canes destroyed, otherwise the cane knives and rats must continue to spread this by direct inoculation. Whole stools have completely died from the effect of Leaf Scald.

Prospects for 1927 are at present very bright. Ratoon and plant cane alike are looking splendid. This state of affairs, in conjunction with the ever-increasing cane area, must return a big crop for the ensuing season.

EL ARISH AND JAFFA.

Poor to good crops are being harvested, much of the stubble under crop is old and really requires renewing. There is not a great deal of plant cane. Leaf Scald disease is well established. H.Q. 426 and the Goru family are more seriously affected. Most of the crop is burnt before cutting. Ratoon shoots were being killed by the larvæ of the big moth and tineid borer, mainly found adjacent to unclean headlands.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING OCTOBER, 1926 AND 1925, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Oct.	No. of Years' Records.	Oct., 1926.	Oct., 1925.		Oct.	No. of Years' Records.	Oct., 1926.	Oct., 1925.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
Atherton	In. 0·92	25	In. 0	In. 0·11	Nambour	In. 3·02	30	In. 0·54	In. 1·70
Cairns	1·89	44	0	0·25	Nanango	2·32	44	0·15	0·07
Cardwell	2·04	52	0	0	Rockhampton ...	1·85	39	0·01	0·70
Cooktown	1·09	50	0·06	0·07	Woodford	2·56	39	0·31	0
Herberton	0·91	39	0	0·06	<i>Darling Downs.</i>				
Ingham	1·59	34	0	0·12	Dalby	2·04	56	1·16	0·22
Innisfail	2·94	45	0·09	3·62	Emu Vale	2·16	30	0·76	0·30
Mossman	2·94	13	0·09	2·66	Jimbour	1·86	38	1·37	0·22
Townsville	1·28	55	0·07	0·09	Miles	2·01	41	0·63	0·19
<i>Central Coast.</i>					Stanthorpe	2·58	53	0·96	0·60
Ayr	1·02	39	0	0	Toowoomba	2·57	54	1·29	0·38
Bowen	1·08	55	0	0·06	Warwick	2·30	61	0·80	0·17
Charters Towers ...	0·69	44	0·26	0	<i>Maranoa.</i>				
Mackay	1·78	55	1·22	0·23	Roma	1·78	52	0·22	0·36
Proserpine	1·82	23	0	0·17	<i>State Farms, &c.</i>				
St. Lawrence	1·78	55	0·12	0·06	Bungewongera ...	1·52	12	0·22	0·21
<i>South Coast.</i>					Gatton College ...	2·05	27	0·82	0·14
Biggenden	2·27	27	1·60	0·25	Gindie	1·42	27	0	0·15
Bundaberg	2·02	43	0·74	0·61	Hermitage	1·89	20	0·63	0·44
Brisbane	2·52	75	0·87	0·35	Kairi	1·10	12	0·22	0·02
Childers	2·45	31	0·51	0·66	Sugar Experiment	1·56	29	0·75	0·21
Crohamhurst	3·61	30	0·56	1·38	Station, Mackay				
Esk	2·42	39	0·42	0·39	Warren	2·14	12	0	0·67
Gayndah	2·38	55	0·43	0·16					
Gympie	2·70	56	0·40	1·31					
Caboolture	2·53	39	0·96	0·61					
Kilkivan	2·58	47	0·60	0·18					
Maryborough	2·63	54	1·05	0·82					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year and for the same period of 1925, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

REPORT OF THE AGRICULTURAL CHEMIST.

THE WORK OF THE YEAR.

The report of the Agricultural Chemist, Mr. J. C. Brünnich, embodied in the annual report of the Department of Agriculture and Stock, contains much valuable information, and from it the following interesting notes have been taken:—

The Soils.

The largest number of soil samples were received in connection with sugar-cane, cotton, and maize culture.

The samples of soils taken in the Atherton Tableland from virgin land, normal land, and sterile patches (Nos. 2383-5) are of particular interest, as shown by the analysis given on Table I. The virgin land shows the largest amounts of total and available potash, with high humus and nitrogen contents. The sterile patches contain an excessive amount of lime. In many of the soils the available potash is too low for successful maize culture.

According to the results of experiments made by Mr. W. T. McGeorge with reference to the availability of potash in Hawaiian soils, the amount of available potash found, by treatment of the soil with 1 per cent. citric acid solution, is a valuable guide for the application of potash fertilisers to sugar-cane crops.

Soils with less than 0.02 per cent. of available potash will, with rare exceptions, respond to fertilising with potash salts, regardless of the lime contents of the soil. Soils with a range of available potash between 0.02 and 0.03 per cent. usually show a slight response, especially if the lime contents are also low. Soils containing more than 0.03 per cent. will not give, with few exceptions, a profitable return from application of potash fertilisers.

The availability of the potash appears to be closely related to the presence or absence of lime.

In looking over our table of soil analysis we find that only 6 soils contain more than 0.03 per cent., 21 more than 0.02 and less than 0.03 per cent. of potash, so that the great majority of our soils should respond to fertilising with potash salts for sugar-cane, maize, and many other crops.

The determination of *soil acidity* by various methods was continued, and in a few isolated cases we found high mineral acidity in samples of soil from Maleny, Cooroy, Bauple, Pialba, and Maroochy.

Investigations carried out elsewhere have clearly shown the association of mineral acidity with various root diseases in many crops, like sugar-cane, maize, and pineapples. The toxic alumina salts, the cause of high mineral acidity, can only be neutralised in the soil and in the plant tissues by a very heavy application of soluble phosphoric acid in addition to liming the soil, and in most cases the cost of such treatment would be prohibitive, and the simplest plan is not to cultivate such acid areas, which fortunately are very rare.

The three soils from Java, given at the bottom of Table I., were submitted by Mr. Brooks, and are supposed to be typical cassava soils. These soils show an enormous variation in their composition, and, according to these analyses, almost any soil appears to be suitable for cassava culture.

The analyses of the principal soil types from Woolthorpe and Walloon, on the Dawson River irrigation area (Nos. 2364-2370), are of considerable interest, and show that soils suitable for almost any crop are represented in this area.

The soils from the Callide cotton research farm show, with a few exceptions, greater uniformity, and analysis proves them to be of good fertility, rich in mineral plant foods.

Waters.

No further samples of waters have been received from stock inspectors with reference to suitability of saline waters for stock, and this important question has not been cleared up.



PLATE 108.—MR. J. C. BRÜNNICH, F.I.C., F.A.C.I., AGRICULTURAL CHEMIST.

Mr. Brünnich was born at Gorizia, Austria, where his father was stationed as a minister of the Lutheran Church. In early youth he went to Switzerland, where he was educated. He studied chemistry under Victor Meyer and George Lunge, the well-known professors at the Federal Polytechnic School at Zurich. Specialising in sugar chemistry he gained practical experience in sugar factories in Bohemia and Russia. Returning again to Switzerland to do his military service as an officer of artillery, he made the acquaintance of the family of Dr. Muller, who practised for many years in the Gayndah district in Queensland, and on his glowing accounts of this State Mr. Brünnich decided to come out here. He arrived in 1885, and secured the management of a small sugar refinery at Bulimba and later became manager of another small mill at Port Darwin. He then joined the staff of the Colonial Sugar Refining Company, with whom he remained for ten years. He was mill manager and chemist at Homebush, in the Mackay district, where, under his direction, much experimental work was carried out, particularly in relation to cultivation, fertilising, and green manuring. He also conducted the first experiments there with the injection of carbon bisulphide for the destruction of cane grubs. In 1897 he was offered and accepted the position of Agricultural Chemist to the Government. Among other duties he held a lectureship in chemistry at the Agricultural College at Gatton. He organised the laboratory of the Agricultural Department, which is considered to be one of the most efficiently staffed and the most completely equipped in the Commonwealth.

For many years Mr. Brünnich has been a member of the Royal Society (Queensland), of which he is a past president. In 1905 he was elected a Fellow of the Institute of Chemistry of Great Britain and Ireland, and is a foundation member and Fellow of the Australian Chemical Institute.

Dipping Fluids.

Out of the 435 dipping fluids analysed, we found only 114 of effective strength, containing between 7.5 and 8.5 lb. of arsenic per 400 gallons, and 78 showed more or less oxidation. In four cases, the addition of skim milk at the rate of 2 gallons to every 100 gallons of dipping fluid brought about a reduction of the arsenic acid to arsenious in about a week's time, and prevented further oxidation for several months.

This simple process, first recommended by Mr. L. Cohen, the chemist of the tick board of control of New South Wales, can be strongly recommended whenever skim milk or butter milk is available, and does away with the costly recharging of dips, in which oxidation of the arsenious acid with the less effective form of arsenic acid has taken place.

Viscera.

Thirty-four samples of viscera and stomach contents were analysed, and in fifteen cases the presence of poison was proved.

Dairy Produce, &c.

Under the Dairy Act a large number of parchment papers used for butter-wrapping were analysed, and in several cases mouldiness of butters was traced to parchment paper containing, contrary to the regulations of the Dairy Act, large amounts of glucose.

Rennet.

Samples of rennet, manufactured in New South Wales, were tested and found to be of excellent quality, equal to the best imported rennets.

FOODS AND STOCK FOODS.

The Queensland Nut.

Of interest are the analyses of a thin-shelled variety of the Queensland nut (*Macadamia ternifolia*) submitted by the grower, Mr. J. F. Waldron, Upper Eungella, Tweed River, New South Wales.

				No. 1. Thin-shelled Nuts with hull rather green.	No. 2. Thin-shelled, hull ripe.	Ordinary Variety with hull ripe.
				Grammes.	Grammes.	Grammes.
Average weight of hull	..	..	..	8.7	..	9.75
Average weight of nut	..	..	..	8.2	7.8	14.8
Average weight of shell	..	..	..	4.8	4.7	10.8
Per cent. shell	..	..	..	58.7	59.9	73.2
Average weight of kernel	..	..	..	3.4	3.1	4.0
Per cent. kernel	..	..	..	41.3	40.1	26.8
Analysis of kernel—						
Moisture, per cent.	..	..	..	28.2	6.1	11.8
Protein, per cent.	..	..	..	8.9	8.7	8.6
Oil, per cent.	..	..	..	52.8	72.7	70.0
Carbohydrates and fibre, per cent.	..	..	..	8.2	10.5	7.1
Ash, per cent.	..	..	..	1.9	2.0	2.5
Hydrocyanic acid	..	..	..	trace	Nil	Nil

Green hulls contained 4.5 per cent. of tannin.

It will be noticed that, although the kernel of the thin-shelled variety is somewhat smaller than that of the ordinary variety, the percentage weight of the kernel is very much larger, so that 1 lb. of the thin-shelled nuts yields $6\frac{1}{2}$ oz. of kernel, as against $4\frac{1}{4}$ oz. of kernel in 1 lb. of the ordinary variety.



PLATE 109. RUNCORN PASTURE RENOVATION DEBATE.



PLATE 110.—RUNCORN PASPALUM RENOVATION PLOT-4.
Close-up view of ploughed portion.

Peanuts.

Mr. F. F. Coleman obtained a nice collection of varieties of peanuts from the New South Wales Department of Agriculture; the analyses of which are herewith given:—

Variety.							Crude Protein.	Crude Fat.
							Per cent.	Per cent.
Sogatum	..	..	..	..	..	..	25.5	51.5
Pondicherry	..	..	..	..	..	..	23.6	51.4
Natal common	..	..	..	..	..	..	28.5	49.7
Brazil	..	..	..	..	..	..	23.1	50.4
Mauritius	..	..	..	..	..	..	25.5	50.8
Transvaal	..	..	..	..	..	..	23.6	49.6
Chinese	..	..	..	..	..	..	29.1	47.9
Valencia	..	..	..	..	..	..	29.9	47.4
Virginia runner	..	..	..	..	..	..	20.6	53.0
African	..	..	..	..	..	..	30.5	47.1
Virginia bunch	..	..	..	..	..	..	23.3	50.5
White Spanish selected	..	..	..	..	..	..	27.0	50.8
Carolina	..	..	..	..	..	..	26.4	51.7
Virginia	..	..	..	..	..	..	25.9	48.4
Barbadoes	..	..	..	..	..	..	24.7	52.0
Norfolk Island	..	..	..	..	..	..	25.5	52.9
Spanish	..	..	..	..	..	..	28.9	48.5
White Spanish	..	..	..	..	..	..	27.5	48.8
Carolina Rhodesia	..	..	..	..	..	..	23.6	49.1

The cultivation of peanuts should be very much extended, and many of our sandy loams are eminently suited for their culture.

Peanuts not only yield a large percentage of valuable oil, but the by-product, the peanut cake, is the most nutritious of oil-cakes, containing over 40 per cent. of digestible protein, which contains a particularly high amount of lysine, an amido-acid absolutely necessary for maintenance and promotion of growth.

Stock Feeding in Dry Areas.

The feeding of starving stock, more particularly of sheep, has been a serious and costly problem in a large portion of our pastoral areas during the present season. Grain, chiefly maize, was largely used, but it was soon found that the animals did not do well, after feeding with grain was carried on for some time, and this was chiefly due to want of suitable roughage. It is quite impossible to feed sheep with the necessary amounts of concentrated foods, unless some roughage is given, which is required to form the “cud.” If no roughage is available on the spot, the cost of handling and transport makes the cost of roughage obtained elsewhere quite prohibitive. The only solution of the problem is the conservation of fodder, whenever possible, to provide for the years of drought, and bush hay will keep its food value even after fifteen years or more of storage.

All sorts of schemes of feeding were tried by stockowners; in some instances meals, chiefly cotton-seed meal and linseed meal, were mixed with salt, and consequently a large number of sheep died of salt poisoning, as the drinking water was also rather too salty. Feeding of a good quality of white maize was also found to be disastrous, as white maize is deficient in certain vitamins which are present in yellow maize.

Feeding of chopped-up whole sugar-cane was not successful. Green sugar-cane tops have a fair food value, but are low in protein, but when using the whole stalk of the cane the food value, with regard to protein, is still much more lowered, and is not improved by the addition of molasses, which is only a condiment and makes dry foods more palatable. Sheep could not possibly consume a sufficient amount of chopped sugar-cane alone, and must die of protein starvation.

Proposals are made to utilise the megass of sugar-cane mills, with the addition of molasses, as a roughage to be put on the market, but there is practically no protein in the megass and molasses, and, therefore, such a roughage would not be worth the cost of transport.

As I found that the local ideas on the value of stock foods and the principles of feeding are in many cases very elementary, I prepared a short pamphlet on "Stock Foods," which is available to all interested on application to the Department of Agriculture and Stock.

I will just give a brief statement with reference to the amounts of various stock foods to be supplied to give a sheep the necessary amount of protein for its maintenance.

A 100-lb. sheep requires per day from 2 to 2½ lb. of dry matter, containing 0.12 lb., or about 2 oz., of digestible protein. This amount of protein is supplied by about 6 lb. of couch grass, 8 lb. of good mixed pasture or saltbush, 10 lb. of green cane tops (a quantity just about as much as a sheep could consume in a day), 20 lb. of chopped whole sugar-cane and tops, 6½ lb. of good bush hay (this gives about 6 lb. of dry matter, or more than double the amount a sheep could eat), 17 lb. of poor bush hay, 1½ lb. of lucerne chaff, 120 lb. of wheat straw, 2 lb. of maize or barley, 1 lb. of bran, 1½ lb. of kubettes, ¾ lb. of treacle cubes, and ½ lb. of linseed meal.

From these figures it is easily seen that a sheep fed only on bush hay or on chopped sugar-cane must starve.

Megass feed would have not as much value as wheat straw, and pinewood sawdust or wood shavings might just as well be utilised as megass.

Stock Licks.

Licks are largely used at present by stockowners—who, however, have no idea what they contain, and in many instances pay high prices for licks which are practically only salt. Licks do not come under the provisions of the Stock Foods Act, and, therefore, purchasers should demand some guarantee on the composition of licks before buying.

The following three analyses of licks, obtained from users, show that only the first has some medicinal value:—

	A.	B.	C.
	Per cent.	Per cent.	Per cent.
Moisture	3.89	1.47	0.60
Insoluble matter	4.50	trace	Nil
Iron and alumina .. .. .	..	0.90	Trace
Magnesia	0.67	0.82	Trace
Lime	14.67	..	0.30
Phosphoric acid	7.85	Trace	Nil
Phosphoric acid, water soluble	3.26		
Sodium chloride (salt)	9.30	91.31	99.0
Sulphur	18.80	Nil	Nil
Sulphuric acid	7.27	2.69	0.30
Arsenic	0.40	Nil	Nil

Home-made licks, made up from special bonemeal and salt, or finely-ground Nauru rock phosphate, using 2 to 3 parts of phosphate with 1 part of coarse salt, are already largely used with highly beneficial results. A very interesting article on "Phosphorus in the Live Stock Industry," reprinted from the South African "Agricultural Journal," appeared in the "Queensland Agricultural Journal" (March, 1925), which should be read by every stockowner. Short articles on the same question appeared in the "Queensland Agricultural Journal," March and April, 1926.

Pasture Improvement.

Renovation of paspalum pasture has become an important question, and several experimental plots have been started by the Department in various places in Queensland, to ascertain the advantages of treating old paspalum pasture by ploughing and fertilising, leaving unploughed portions as controls.

At Maleny the ploughed portions recovered very quickly, and much larger cuts of grass were obtained from the ploughed plots than from the unploughed plots. At Cooroy, however, only the last cutting showed an increased yield in the ploughed plots over the unploughed ones, and this is due to the fact that the soil at Cooroy was shallower and the ploughing was done much more roughly.





PLATE 112.—FODDER PLOTS AT RUNCORN.

View of Foxtail Millet Crop; sown 5th January, 1926. Photo. taken 8th February, 1926.
On left, unmanured; on right, manured.

The following table gives the yield of dry matter contained in the grass by all the cuttings made from time to time:—

MALENY.		COOROY.	
Tons per acre of dry matter obtained by—			
8 Cuttings 16/4/25 to 23/2/26.		6 Cuttings, 20/11/25 to 24/4/26.	
Total tons per acre.	Gain or loss over average yield of unfertilised plots.	Total tons per acre.	Gain or loss over average yield of unfertilised plots.
PLOUGHED PORTIONS.			
Per cent.	Per cent.	Per cent.	Per cent.
4.88	—	1.44	—
5.52	+	1.80	+
4.80	—	1.68	+
5.20	+	1.50	—
5.20	+	1.86	—
6.24	+	2.64	+
6.16	+	1.56	—
6.72	+	1.20	—
UNPLOUGHED PORTIONS.			
2.64	—	1.86	—
2.80	—	1.86	—
3.54	—	2.16	—
3.28	—	2.10	—
4.56	+	3.12	+
4.80	+	3.78	+
3.92	+	3.06	+
3.60	..	2.46	—
Fertiliser Used per Acre.			
Nil	.. .. .	.. .. .	.. .. .
$\frac{3}{4}$ ton agricultural lime	.. .. .	.. .. .	.. .. .
$\frac{1}{2}$ ton air-slaked lime	.. .. .	.. .. .	.. .. .
1 cwt. Nauru phosphate	.. .. .	.. .. .	.. .. .
Nil	.. .. .	.. .. .	.. .. .
$\frac{3}{4}$ cwt. Nauru phosphate and $\frac{3}{4}$ cwt. superphosphate	.. .. .	.. .. .	.. .. .
1 cwt. Nauru phosphate, $\frac{1}{2}$ cwt. potassium sulphate, $\frac{1}{2}$ cwt. nitrate of soda	.. .. .	.. .. .	.. .. .
1 $\frac{1}{2}$ cwt. basic superphosphate	.. .. .	.. .. .	.. .. .
UNPLOUGHED PORTIONS.			
Nil	.. .. .	.. .. .	.. .. .
$\frac{3}{4}$ ton agricultural lime	.. .. .	.. .. .	.. .. .
$\frac{1}{2}$ ton air-slaked lime	.. .. .	.. .. .	.. .. .
1 cwt. Nauru phosphate	.. .. .	.. .. .	.. .. .
Nil	.. .. .	.. .. .	.. .. .
$\frac{3}{4}$ cwt. Nauru phosphate and $\frac{3}{4}$ cwt. superphosphate	.. .. .	.. .. .	.. .. .
1 cwt. Nauru phosphate, $\frac{1}{2}$ cwt. potassium sulphate, $\frac{1}{2}$ cwt. nitrate of soda	.. .. .	.. .. .	.. .. .
1 $\frac{1}{2}$ cwt. basic superphosphate	.. .. .	.. .. .	.. .. .

The results of the weighings of square yards obtained from the enclosed portion of each of the plots showed great variations, and only one of the experiments, with the application of Nauru phosphate-superphosphate mixture, showed a decided gain in all four plots. The plots with complete fertiliser gave a gain in three plots and a loss in one, whereas the plots dressed with basic superphosphate showed a considerable increase in only one of the four plots.

A large amount of analytical work, both with individual cuts of the grasses and of composite samples, was carried out, but no definite conclusions can be drawn from the results obtained. It is quite useless to publish complete tables of these analytical figures, but I will give a short summary of the results of the average analyses of all the cuts from the various plots, and also the maximum and minimum amounts found.

These amounts are calculated on the green material as cut, which contained an average moisture of 70 per cent., and, therefore, the amounts in the dry materials would be about three times as much:—

—	Protein.	Fibre.	Ash.	Phosphoric Acid in Ash.	Lime.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
IN GREEN MATERIAL.					
Cooroy, ploughed plots	3.9 (3.5—4.2)	9.9 (8.9—10.6)	3.2 (2.9—3.4)	.094 (.090—.111)	.222 (.085—.250)
Cooroy, unploughed	3.2 (2.9—3.4)	8.4 (9.4—10.6)	2.2 (2.0—2.4)	.068 (.059—.079)	.091 (.078—.102)
Maleny, ploughed plots	3.0 (2.5—3.5)	7.2 (6.1—8.2)	2.4 (1.9—3.1)	.112 (.097—.135)	.256 (.205—.325)
Maleny, unploughed plots	3.1 (2.4—3.7)	7.8 (5.6—11.5)	2.8 (2.0—4.2)	.110 (.088—.126)	.313 (.155—.630)

Runcorn Paspalum Trials.

Due to unfavourable season, only one cut of the ploughed and unploughed plots of this experimental area was made, on the 12th May, 1926; but no conclusions can be drawn from the weights obtained from 1 square yard of each plot. Difference in the growth apparent in the first growth, more particularly in the plots fertilised with fine bonemeal and with complete fertiliser, showing better growth and greener appearance than any of the other plots, disappeared as the grass got older. The difference between the growth of the grass on the ploughed and unploughed portions is very striking, and is clearly shown in the photograph. The grass on the ploughed portion is of much more vigorous growth and has more flag than on the unploughed plots. The bare patches left after ploughing between the furrows are at present covered with young seedling paspalum.

As the quantity of fertiliser applied at first was undoubtedly on the low side, trying to keep the cost low, a further application of fertilisers has been made this year, and the cuttings to be made in the coming spring should show great differences. Arrangements, however, must be made to obtain true average weights of grass from each plot, by cutting and weighing the whole of each plot, or at least a large proportion of it.

Fodder Plots.

An interesting series of experiments with fodder crops were also carried out at Runcorn, and proved the great advantages derived from fertilising. The following table gives the results of yield and analyses of the crops grown under rather adverse climatic conditions, and we find in two cases the weight of the green and dry material practically doubled by the use of fertilisers. The fertiliser used was a 6-16-4 mixture applied at the rate of 645 lb. per acre.

The season was not all favourable, and between the time of sowing (6th January, 1926) and harvesting (2nd March, 1926), only 145 points of rain were registered in January and 18 points in February.

The crop of the fertilised maize was of much better growth than that of the unfertilised plot, only the weight is not any better because the crop was thinned out by pigeons getting at the freshly-sown maize. The sorghum yield was also very much better than indicated by the weights obtained, and the photograph given of these plots shows a very great difference between the fertilised and unfertilised plots.

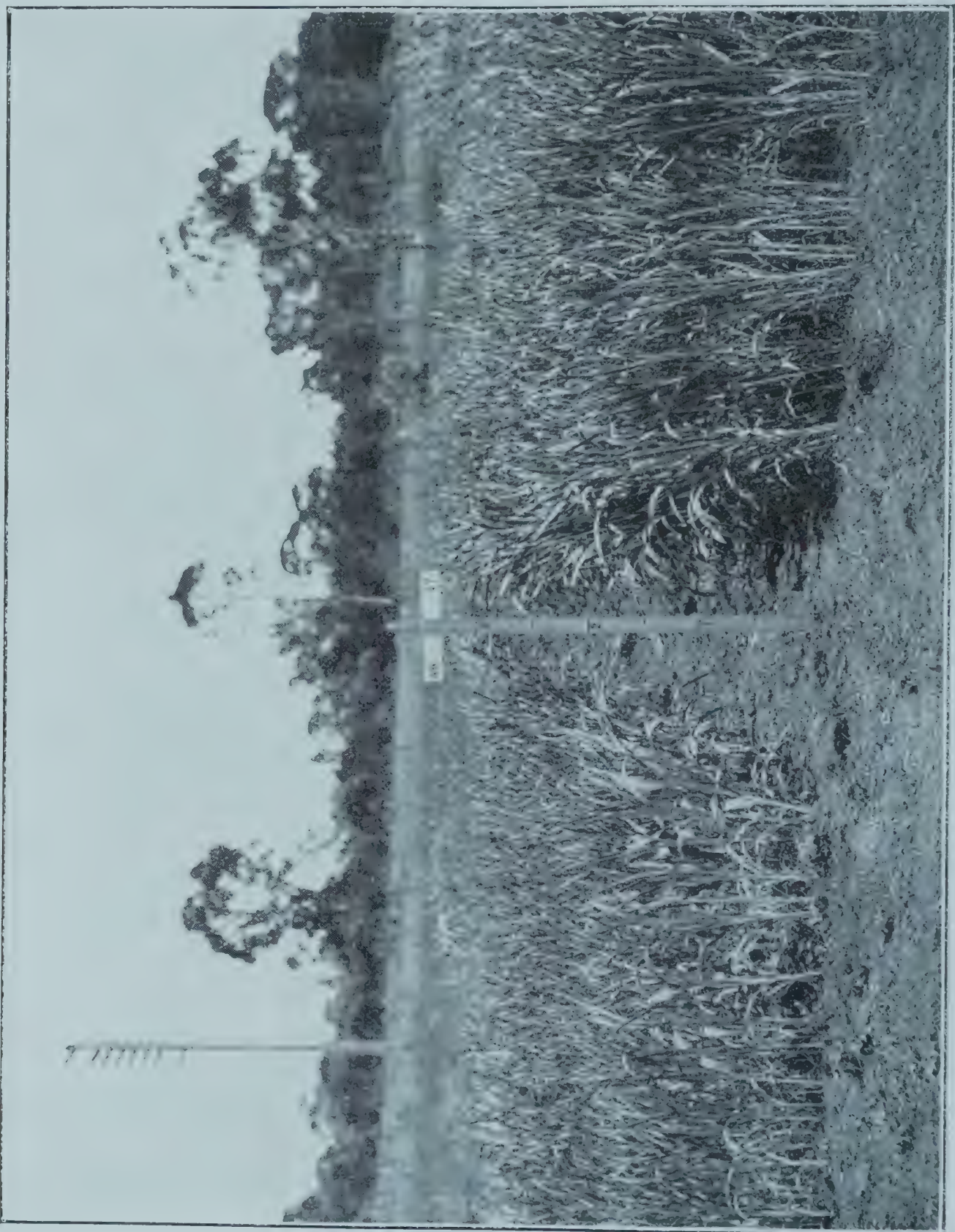




PLATE 114.—RUNCORN FODDER PLOTS.
Close-up view of Foxtail Millet; unmanured and manured.

Only a small amount of hydrocyanic acid, in quite harmless quantities, was found in the youngest stages of growth in Sudan grass and Saccaline sorghum.

These fodder trials will be repeated this year on similar lines.

RESULTS OF FODDER PLOT TRIALS.

	ANALYSES OF GREEN MATERIAL.							EIGHT WEEKS GROWTH.		HYDROCYANIC ACID IN GREEN SAMPLE.		
	Moisture.	Crude Protein.	Carbo-hydrates.	Crude Fat.	Crude Fibre.	Crude Ash.	Lime in Ash.	Tons per Acre.		Cut 5-2-26.	Cut 25-2-26.	Cut 23-2-26.
								Green.	Dry.			
Foxtail millet (<i>setaria italica</i>)—												
Manured ..	53	2.6	25.6	.5	15.4	3.2	.49	4.9	2.3	Nil	Nil	Nil
Unmanured ..	52	2.2	24.5	.5	16.2	4.6	.42	2.5	1.2	Nil	Nil	Nil
Maize—												
Manured ..	77	1.0	13.0	.2	7.3	1.5	.13	11.3	2.6	Nil	Nil	Nil
Unmanured ..	80	1.1	10.6	.2	6.7	1.5	.07	12.1	2.5	Nil	Nil	Nil
Sudan grass (<i>sorghum sudanense</i>)												
Manured ..	64	1.3	19.7	.4	11.9	2.8	.18	4.6	1.6	0.75	Nil	Nil
Unmanured ..	66	1.6	17.8	.3	10.9	3.4	.22	2.4	0.8	0.5	Nil	Nil
Saccaline (<i>sorghum vulgaris</i>)—												
Manured ..	71	1.0	17.2	.3	7.7	2.8	.12	7.8	2.3	2.0	Nil	Nil
Unmanured ..	68	1.3	17.7	.4	9.0	3.6	.17	6.2	2.2	1.0	Nil	Nil

9.0 = $\frac{1}{4}$ grain of H.C.N. per lb.

CHAIRMANSHIP OF THE CENTRAL CANE PRICES BOARD.

RETIREMENT OF MR. JUSTICE O’SULLIVAN.

The Minister for Agriculture, Hon. W. Forgan Smith, referred, in the course of a recent Press announcement, very appreciatively to the work of Mr. Justice O’Sullivan, who has just resigned the chairmanship of the Central Cane Prices Board under the Cane Prices Act. The Act was passed in October, 1915, and Mr. Justice O’Sullivan was appointed the first chairman of the Central Board on the 9th December of the same year. He continued in that position, without intermission, for eleven years. The manner in which the work of the Central Board has been carried out, with satisfaction to both the growing and milling interests, has been due to the able and impartial manner in which Judge O’Sullivan presided over the functions of the Central Board. As illustrative of the intrinsic progress made by the sugar industry since the Act was passed, the following figures are illuminating:—

	1915.	1925.
Area crushed	94,459 acres	189,466 acres
Total Cane crushed	1,152,516 tons	3,668,252 tons
Average Cane per acre	12.20 tons	19.36 tons
Total Sugar produced	140,496 tons	485,585 tons
Sugar produced per acre	1.49 tons	2.56 tons
Cane required to make a ton of Sugar	8.20 tons	7.55 tons
Total value of Sugar produced	£2,528,928	£9,482,989

Mr. Forgan Smith added that he was expressing the views of the whole of the sugar industry when he stated that during the period of his term as chairman, Mr. Justice O’Sullivan had enjoyed the fullest confidence of the growers, the millers, and the Government.

HIGHWAY IMPROVEMENT IN QUEENSLAND.

THE WORK OF THE MAIN ROADS COMMISSION.

What the Romans thought, wrought, and taught in the way of sound citizenship as expressed in public highways that have stood the wear and stress of centuries serves, perhaps, as something in the way of inspiration to the Authority to which has been entrusted the construction of arterial highways in rural Queensland.

In these days of almost universal motor transport main road construction is receiving greater and intenser attention. The district that will prosper most is the district that has a well-maintained system of road communication.

Looking to a future Queensland balanced in industry, and balanced in everything else that matters, a widespread realisation is evident that the broad highway is one of the strongest influences in the development to the full of our national life.

The subjoined abstract from the Annual Report of the Main Roads Commission for the current year gives some idea of the work of that Authority. We are also indebted to the Commission for permission to reproduce the fine set of plates accompanying it.—Editor.

Beloc in a recent essay on "The Road" says in his introduction:—

"We have arrived at a chief turning point in the history of English highways. New instruments of locomotion, a greater volume of traffic, a greater weight in loads, and vastly increased rapidity in road travel have between them brought us to this issue; either some very considerable and immediate change in the character of the road, or a serious and increasing handicap in our rivalry with other nations through the strain and expense of an outworn system."

If this be true of a country whose road construction began with the Roman invasion, then what of such a country as this with its vast spaces requiring proper means of communication for development and social intercourse? That we have arrived at that turning point is instanced by the fact that in 1922 the motor vehicle registrations in the State totalled 11,000, whilst to-day (four years later) they total 47,000 net.

The increase of motor trucks in the same period is from 500 to 2,300.

This tremendous increase in mechanical road transport has brought its attendant troubles in the maintenance of roads, and serious consideration is required as to the means which should be adopted for financing the cost of this maintenance.

The old methods of maintenance are insufficient wherever the bulk of traffic consists of motor vehicles, and it has become necessary to bitumen surface many new roads.

In the early stages, maintenance work was confined to repairs of existing old roads, making boggy places temporarily passable, and patching up old bridges, but the construction of every mile of new road has entailed a responsibility for its maintenance. The report of the New Zealand Highways Board indicates that the cost of maintenance under present conditions of rural traffic has increased to over £50 per mile per annum over the total length of roads controlled by the Board, many of which are probably unconstructed.

One hundred thousand pounds will be absorbed this year in the maintenance of the main road system of this State, and the requirements are growing at a rapid rate.

The March of the Motor Vehicle.

The problem of location of new roads assumes a somewhat different aspect to-day to that of a dozen years ago. The horse at best could double his tractive effort for but a short space of time and thus a steep grade greatly limited his load.

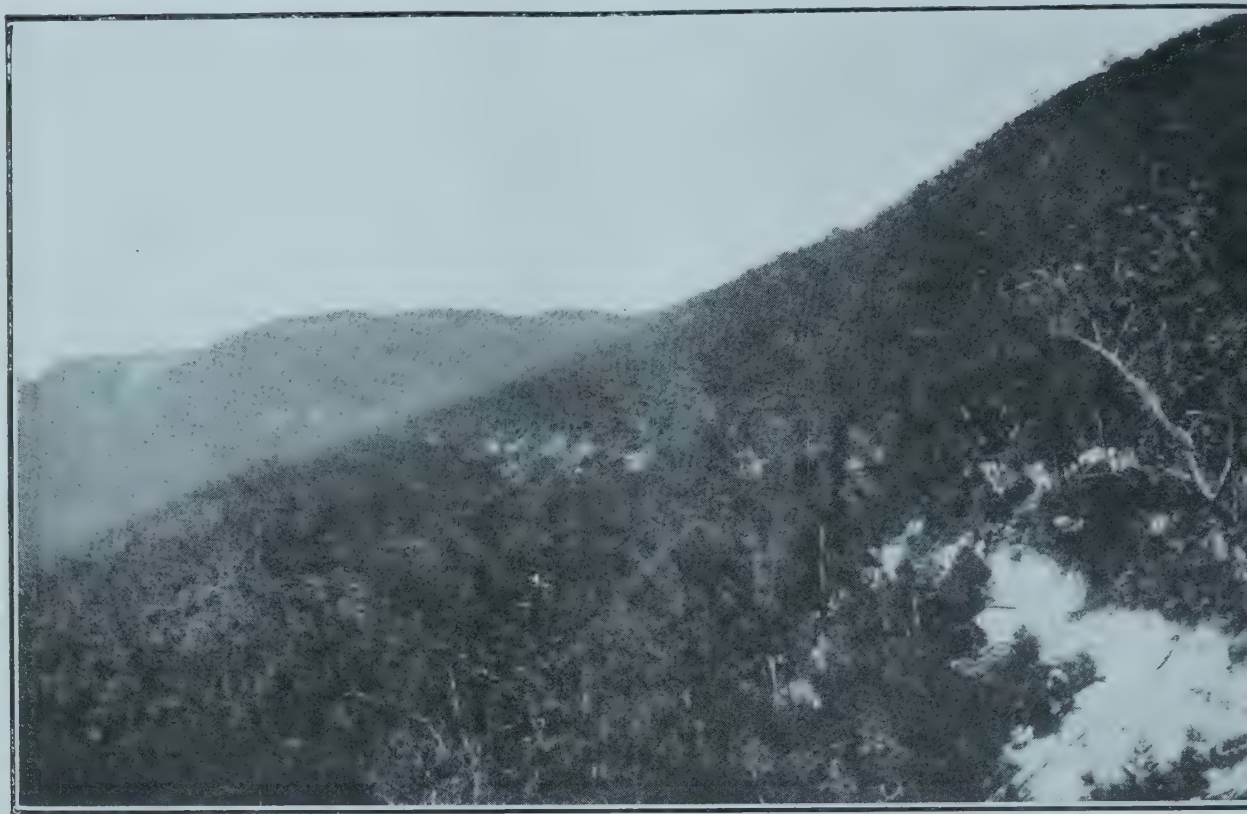


PLATE 115.—CAIRNS-TABLELAND ROAD, NORTH QUEENSLAND. GENERAL VIEW SHOWING
ROAD ALONG MOUNTAIN SIDE.



PLATE 116.—CAIRNS-TABLELAND ROAD. SECTION NEAR TOP OF RANGE.



PLATE 117.—BURRUM SHIRE. LOW-LEVEL BRIDGE OVER BURRUM RIVER, UNDER CONSTRUCTION.



PLATE 118.—KOLAN SHIRE. GIN GIN CREEK LOW-LEVEL BRIDGE, GIN GIN-MIRIAM VALE ROAD.

The motor vehicle by momentum and gear changes makes light of short comparatively steep grades, and practically no loss of energy occurs due to undulating grades (which are often necessary in order to obtain the shortest possible line between two given points), provided the height climbed in each rise is not greater than that just necessary to allow the vehicle to coast down the opposite side of the hill without unnecessary application of brakes. Every foot climbed above such a height represents lost energy.

On the other hand, unnecessary length introduced into the road means a loss which according to the report of the Brisbane Cross River Commission may be averaged at 6d. per vehicle mile.

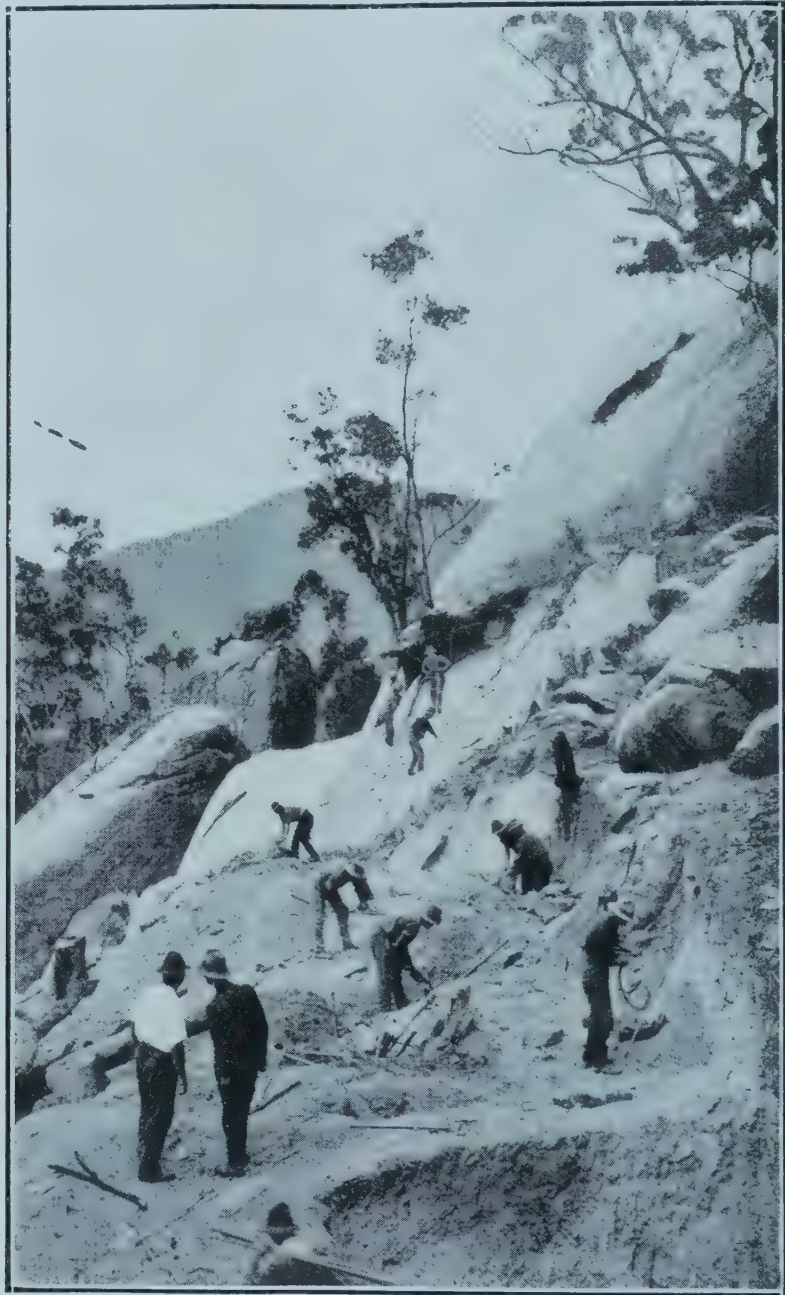


PLATE 119.—CAIRNS—TABLELAND ROAD. MEN WORKING MACHINE ROCK DRILLS.

As an example, 500 vehicles a day travelling an unnecessary length of one-tenth of a mile on easy grades will occasion a waste expenditure of £456 per annum, or nearly one pound per vehicle.

It would be a much better proposition for the owners of those vehicles to pay an extra tax of £1 per annum to the road funds and thus make it available for maintenance of correctly located and soundly built roads rather than have it wasted in useless effort. The losses due to grade and unnecessary climbing are equally serious although not so obvious, but it may be said generally that to-day alignments and grading problems are of equal importance.

The Brisbane Cross River Commission has also estimated that the average power and maintenance costs per foot ton for road vehicles equals .019d.

Five hundred vehicles unnecessarily climbing, say, 200 feet per day, would represent a loss of energy of 100,000 foot tons having a value of £8, or £2,920 per year.

These figures will instance the necessity for care in locating new roads.

Whilst the motor vehicle can climb undulating grades under the conditions previously mentioned without loss of energy, serious losses and severe limitation of loading would be imposed by the imposition of long, steep grades, and it is

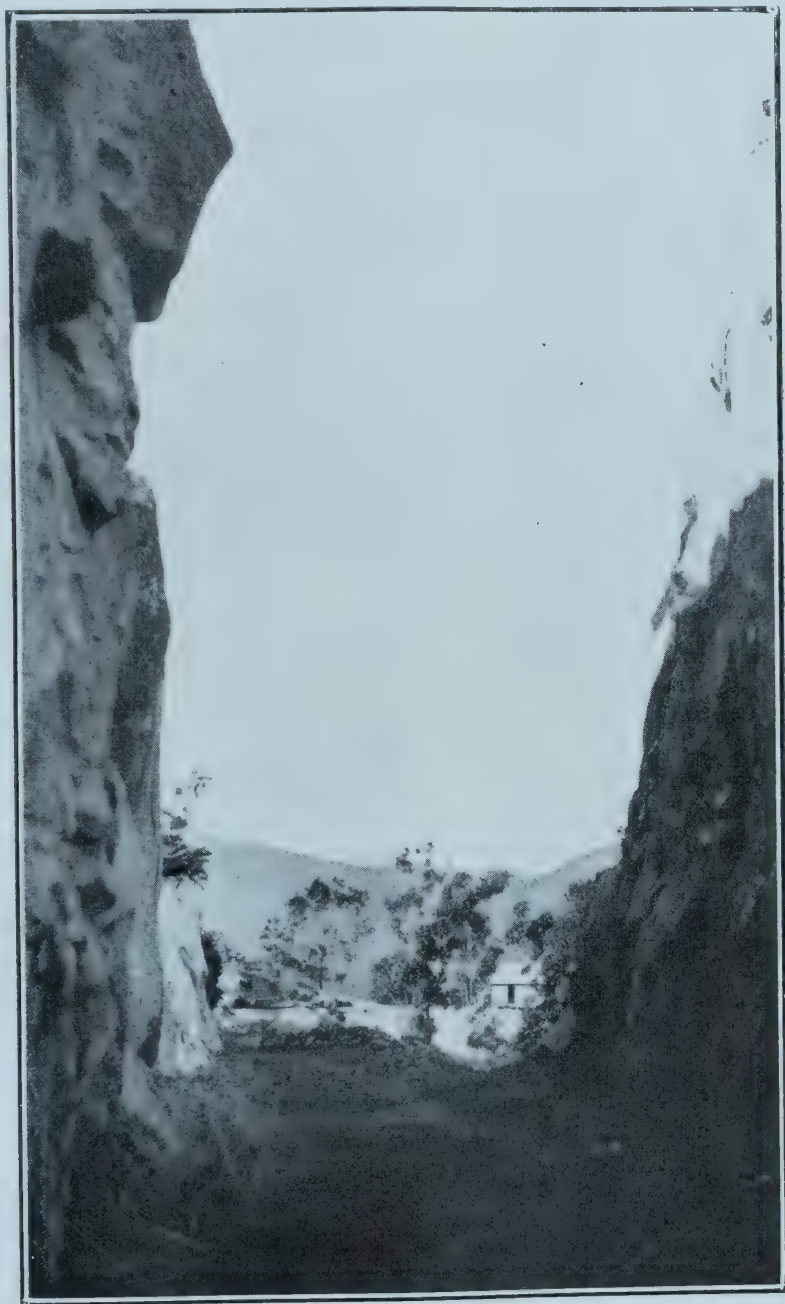


PLATE 120.—CAIRNS-TABLELAND ROAD, SHOWING
GRANITE CUTTING.

therefore of great importance that long grades should not be steeper than 5 per cent. on main routes, although many instances occur where it becomes necessary to adopt a steeper long gradient. The Palmwoods-Montville road at present under construction is an example.

A grade of 5 per cent. could have been obtained on a certain route at a very greatly increased capital cost, including the capitalised value of maintenance, but a grade of 6 per cent. or thereabout was adopted for the reason that sound country for construction was secured and the top of the road emerged at a point on top of the Blackall Range which very much better suited the whole area to be served.

The works in the Northern division are, in a number of instances, designed to open up practically virgin country, and it must here be stated that the shires have willingly shouldered their very considerable obligations.

The Value of Good Roads—Concrete Evidence.

Certain very important evidence of increase in the wealth of a district due to the construction of a road was recently brought out at deputations from Maleny requesting an extension of the road system. The deputations represented dairymen, merchants, butter factory and milk supply interests.

Cream cartage contracts between Maleny and Landsborough were stated as showing a saving of £800 per year, whilst passenger fares have been reduced by 50 per cent. as a result of the construction of the new road. It may be assumed that back loading charges for ordinary merchandise have been greatly reduced also, but the biggest factor of all is that Maleny now supplies over 1,000 gallons of milk daily for Brisbane. The extra profit on this milk for the farmer as compared with cream is stated at £25 per day, or £9,125 per annum. It is hoped to double the quantity in the near future. The regular supply of this milk was impossible until lately, when the construction of all the worst sections of the Landsborough-Maleny road were completed. This additional prosperity must surely also be reflected in increased railway earnings. The supply of 1,000 gallons of milk by rail to Brisbane alone represents approximately 4 tons of extra freight per day.

The old road cost £1,600 a year to maintain, whilst the new road, giving 100 per cent. of service in all weathers, has not cost more than a few hundreds in maintenance since the opening of the first section nearly three years ago. Considerable sums have, of course, been expended in keeping old sections in repair during construction of the new.

Strong evidence exists in Kingaroy district to show that great savings in freight charges have resulted from main road construction after allowing for interest and redemption payable thereon, whilst very considerable trade and interchange of products have been brought about owing to improvements effected to Kingaroy-Bell road.

A much greater impetus still will be given when the deviations necessary to shorten length and improve gradients have been effected in the vicinity of Bunya Mountains, near Porter's Gap.

The opening, in the course of the year, of a bridge over the Boyne River, in the Burrandowan area, was acclaimed as the most important event in the history of the settlement and will prevent that interruption of traffic which was previously so common, and will eliminate risks of recurrence of unfortunate loss of life which has occurred previously in attempts to cross the flooded river.

Tourist Roads.

The cost of the Range section (on the Cairns Range road between Little Mulgrave River and Lake Barrine—a distance of sixteen miles) up to 30th June of this year amounted to £129,410 1s. 8d., and its construction involved very heavy rock excavation over the greater portion of the length.

Financial considerations limited the construction to that sufficient for one-way traffic, which is regulated according to a published time-table. The ruling gradients are 5 per cent. with due compensation on curves.

Roads are needed not only for pure development purposes, but for health reasons, to enable people to readily obtain a change of climate from coast to highlands and vice versa. The Cairns Range road may be bracketed in this respect with the Maroochy, Tewantin, and Redcliffe roads, and such roads as Tambourine and Canungra-Beechmont, inasmuch as they both open up scenic beauty and are developmental in character.

The Townsville Council has offered to subsidise a road to Hervey Range to the extent of £600 per annum practically for health purposes, and Thuringowa Shire offers another £200 per annum for an entirely different reason.

It may be here not inopportune to draw attention to the necessity for a tourist road vote which should be employed for opening up such places as the National parks, waterfalls, and camping grounds at high elevation in various parts of the State.

It is seldom that such projects fall within the ambit of main road operations. From a business point of view it would pay to let the citizens of the State see their own beauty spots first. The amount of money spent in visiting Southern health resorts alone, if retained in the State, would go far towards recoupment of the amounts expended, and the opening up of these places would certainly attract people from other lands to linger in the State.



PLATE 121.—MUNDUBBERA SHIRE. LOW-LEVEL BRIDGE OVER THE BOYNE RIVER.
NATIONAL GRANT PROJECT.



PLATE 122.—NERANG SHIRE. BRIDGE OVER LITTLE NERANG RIVER, ON THE MUDGEERABA-
SPRINGBROOK ROAD. NATIONAL GRANT PROJECT.



PLATE 123.—BURRUM SHIRE. . MARYBOROUGH-PIALBA ROAD.



PLATE 124.—GYMPIE ROAD, RECENTLY CONSTRUCTED. SECTION NEAR BALD HILLS.



PLATE 125.—CURVES ON THE KINGAROY-BARKER'S CREEK ROAD, KINGAROY SHIRE.



PLATE 126.—MURGON-BARAMBAH ROAD, IN MURGON SHIRE, LOOKING TOWARDS BARAMBAH.
ROLLING INCOMPLETE.



PLATE 127.—TIARO-BAUPLE-GOOTCHIE ROAD, IN TIARO SHIRE.



PLATE 128.—KOLAN SHIRE. GIN GIN-MIRIAM VALE ROAD, SHOWING A DEVIATION TO AVOID A STEEP GRADE.



PLATE 129.—GILDED ROSE DEVIATION. CLONCURRY-WINTON ROAD, CLONCURRY SHIRE.

DUSTING FOR AN IMPORTANT QUEENSLAND INSECT PEST.

The November number of the "Queensland Agricultural Journal" contained a brief note by the Chief Entomologist (Mr. Veitch) dealing with a small bug that has in recent weeks been responsible for very serious losses both in field crops and in orchards. The abnormal abundance of the insect in question (*Nysius* sp.*) afforded an opportunity for testing out certain dusts for the control of this pest under existing Queensland conditions, and decidedly promising results have been obtained by the use of calcium cyanide and nicotine dusts; these dusts will be used in further field trials.

Success in the control of a pest by either dusting or spraying depends on the following:—(1) The dust or spray employed must give a high percentage of mortality in the insects treated; (2) the cost of the material and the amount of labour employed must be such that the control measure is economically practicable; (3) the treatment adopted must have little or no injurious effect on the plants that are dusted or sprayed; (4) the dust or spray employed must be capable of being used with safety by the operator when due care is observed in its application. Complete success in control is obtained only when all these conditions are fulfilled by the dust or spray employed.

The Entomological Branch of the Department of Agriculture and Stock intends to carry out further field experimental work in connection with this very important pest, and in handling the question of control the practicability, safety, and efficiency of any new control measure will be constantly kept in view. Naturally, any new control measure must be subjected to repeated trial before it can be recommended for general adoption.

* This species is frequently referred to as the "Rutherglen Bug."—R.V.

OBITUARY.

SIR ALFRED COWLEY.

The late Sir Alfred Sandlings Cowley, whose death occurred at Brisbane on 1st December, was a prominent figure in the political and commercial life of the State, and held the portfolio of Secretary for Public Lands and Agriculture in the Mellwraith-Griffith Administration until 1893, when he entered upon a long and distinguished career as Speaker of the Legislative Assembly.

The late Sir Alfred was a Gloucestershire man, born at Fairford on 24th April, 1848. As a young man he went to South Africa, and in 1880 he married Miss Marie Campbell, daughter of Mr. William Campbell, of Natal, and sister of Dr. Campbell, a revered citizen of Durban, whose death occurred a few weeks ago. Lady Cowley, who survives Sir Alfred, is the aunt of Miss Campbell, who was known to many Australian Diggers of the A.I.F., as "The Angel of Durban."

Sir Alfred Cowley came to Queensland subsequently, and having been engaged in sugar planting in South Africa he went North, took up sugar lands, and became a prominent grower. For nearly twenty years he represented the Herbert electorate, his successor being the Hon. William Lennon, now Lieutenant-Governor of Queensland.

He was knighted in 1904. Seventeen years later, long after he had retired from active politics, and because of excellent work during the war, Sir Alfred was awarded the Order of the British Empire.

After leaving active politics Sir Alfred devoted his attention to several great commercial concerns with which he was associated. He was chairman of the local board of advice to the National Bank of Australia, and chairman of the Brisbane Board of Directors of the Australian Mutual Provident Society; and during the war he was chairman of the Queensland Patriotic Fund. At the time of his death he was one of the two trustees of the Royal National Association.

In the funeral cortege were many representatives of every section of citizens, including the Lieutenant-Governor, Parliament, the Judiciary, the Services, Commerce, Industry, and the Department of Agriculture and Stock, of which he was a former Ministerial chief.

THE FEEDING OF LIVE STOCK.

By J. K. MURRAY, B.A., B.Sc.Agr. (Sydney), N.D.D. (Scotland),
Principal, Queensland Agricultural High School and College.

The following is the first of a series of lecturettes broadcasted from the Radio Studio, of the Council of Agriculture through the Queensland Government Radio Station, 4QG:—

To understand just what we want to do helps greatly in doing it in an efficient, economic way. A good cow is a much more complicated and efficient piece of machinery than the largest factory in the Commonwealth. Let us try to follow just what we want to do when we feed a pregnant milking cow. This pregnant milking cow, of course, is doing all these jobs:—

Operating Machinery.—Running all her motor machinery; walking, feeding, pumping blood and other fluids, breathing, and operating a nervous system which is more complicated than an automatic telephone exchange.

Daily Repairs.—Making continuous repairs to all her machinery. Hoofs, skin, and hair are renewed, muscle and nerve fibres are repaired when worn, replacements are made of broken-down brain, heart, and kidney substance, of worn parts of lymphatic, thyroid, and milk glands, &c. Parts wear, but the cow is not periodically laid-up for adjustment and replacement of parts.

Calf Formation.—She is gradually building up the body of the foetus or young calf. From the time the ovum or egg in the womb is fertilised by the male sperm,

there is within the pregnant cow a being which requires more and more food from the cow's blood. The cow, in forming the calf, is as truly manufacturing a new piece of machinery as is a railway workshop which is making a new locomotive.

Milk Formation.—The cow is manufacturing milk. Milk is a most complex substance, and, with all the recent and wonderful progress of agricultural and dairying science, we are still not aware of just how some of the substances in milk are made or even of their exact composition.

We justly pride ourselves on our ability to manufacture indigo in chemical factories in place of obtaining it from the indigo plant. We are, however, far, far from being able to manufacture milk.

Putting on Condition.—Lastly the cow may be putting on fat. With beef cattle this is, of course, an important piece of work.

To summarise, the milking cow is operating all her machinery and repairing it; she may be making a future cow; she is producing milk, and, may-be, fat.

To operate her machinery the cow will need fuels to supply energy and heat. The common fuels used by animals are sugars and starches, and are called carbohydrates. To repair her machinery she will require repair materials. Most of her machinery is not composed of metals like a car, but of materials we call proteins; some of the cow's machinery is made of compounds of metals which are generally termed mineral ash. It follows that, for repairs to the cow's machinery, we must supply proteins and compounds of metals (mineral ash), just as we must supply various kinds of metallic material to repair an engine. Proteins and mineral ash are quite distinct from carbohydrates, and the proportions of these substances in common foodstuffs (like maize and lucerne) is greatly different.

To form the body of the calf we will need to feed materials to the cow from which she can construct it. These, again, are mainly proteins and mineral ash.

To form milk, which is designed by nature as a complete food from which the calf can develop its body and operate its machinery, obviously proteins, mineral ash, and fuel (sugars and starches) will be required.

Forming Fat.—Fat can be most economically formed, as a general rule, from starch-rich foods. Foodstuffs for animals generally contain a small quantity of fat or oil, which may be used as fuel for the formation of heat and energy; fat or oil have about twice the energy value of starches.

So far we have not considered one group of substances which are an essential part of a ration, but concerning which we know little except their value. These are the vitamins.

Vitamins.—It was once believed that if an animal were fed on pure proteins, carbohydrates, fats, and mineral substances all its needs for life and growth would be met. We now know that there are substances called vitamins which are essential for life and growth. The required amount of each is small. One of them, which is called "A" is present in green plants, particularly lucerne. The minute amounts present in the plants are found collected in the milk fat. Butter is thus rich in this vitamin, and is a much more valuable food for children than margarine. This vitamin promotes growth, prevents certain bone diseases like rickets, and also an eye disease. A young animal ceases to grow if deprived of it, and eventually dies. Fortunately vitamin "A" is not injured by pasteurisation and most manufacturing treatments. Cod liver oil is rich in this vitamin, but the main source of our supply for human beings is milk. Colostrum, the small amount of butter-fat in separated milk, and green pickings seem to supply the necessary amount to calves and pigs. Some proprietary calf foods contain cod liver oil, the object being to supply the calf with the vitamin "A" removed from the milk in separating the butter-fat.

Vitamin "B" is present in most common foodstuffs, and, like "A," is resistant to heat and other processes. Pigeons deprived of it develop nerve-spasms, while human beings deprived of it or a closely associated vitamin get a disease called Beri Beri. In this connection it is interesting to note that Beri Beri is common among Chinese and others who are fed on a sole diet of polished rice, while those who receive unpolished rice are free from the disease. Vitamin "B" is present in the rice husk.

Vitamin "C" prevents scurvy. It is present in living plants, fresh milk, lime-juice, oranges, lemons, tomatoes, &c. Its value to domestic animals is somewhat uncertain, though its importance to human beings cannot be gainsaid. Animals apparently cannot form vitamins, but obtain them from plants. There may be some exceptions. It is unlikely that diseases due to vitamin deficiencies will trouble our domestic stock.

In the next lecture some information will be given about the substances (protein and mineral ash) animals use for forming young and repairing their bodies, and the other substances (carbohydrates) mainly used for energy.

TOMATO CULTURE—CALIFORNIAN METHODS.*

Except where following spinach or other winter crop, tomato land should be fall-ploughed as deeply as possible. In spring, before the surface gets hard and dry, the land should be disced to kill weeds and get the soil into fine condition. The method of preparing for the plants and method of transplanting depends upon the locality and the soil conditions. In most sections, when setting for the early crop, it is easy to set the plants without watering if the soil is handled properly. Under such conditions, the field is prepared level and marked off in both directions and the plants set at the intersections if they are set by hand. In setting large acreages, however, much time and labour can be saved by the use of a horse-drawn transplanter. These machines, of which there are several types on the market, set the plants as well as they are usually set by hand, and can be used to water the plants if watering is necessary.

In dry sections and in most sections during dry seasons it is necessary to water the plants as they are transplanted. This is almost always necessary in setting the late crop. If irrigation water is available, the simplest plan is to mark the rows with a plough. The plants are set the proper distance apart on the edge of the furrow and a small stream of irrigation water is turned into each row as it is set. Cultivation must follow within a day or two, to prevent a hard crust forming around the roots. At this time the soil should be worked toward the plants, thus beginning the bed which should be gradually formed for each row.

Another way to set plants under dry conditions is to haul a number of barrels of water into the field, placing the barrels across the field at convenient intervals. As the plants are set, a little water is poured about the roots from a can.

In transplanting tomatoes, the plants should be set as deeply as possible, usually 4 or 5 inches deeper than the plants were in the plant bed. New roots develop along the stem, giving the plant a much larger and deeper root system than can be obtained when the plants are small and set shallow. Deep setting is, of course, more laborious than the customary shallow setting, but it encourages the plants to develop large, deep root systems, which enables plants to make use of the moisture in the lower soil. Deeper ploughing than usual for tomatoes aids in securing the same result. Plants with deep roots are most assured of an even moisture supply, do not require so frequent irrigations, and do not suffer from the sharp fluctuations of alternately having too much and not enough water. It seems that many of the troubles affecting tomato plants in California are connected with their shallow root systems.

Irrigation.

In some parts of the State, satisfactory tomato crops can be grown with little or no irrigation, if the plants are given a chance to develop deep root systems. However, in most sections some irrigation is necessary, the number and frequency of irrigations being determined mostly by local conditions. Enough water should be applied to keep the plants growing steadily. Over-irrigation favours excessive vine growth and sometimes causes the blossoms to drop without setting fruit. The best method is to open a furrow alongside each row of plants so that the moisture can seep down to the roots without wetting or compacting the surface soil (fig. 3). Cultivation should follow promptly, throwing the soil toward the plants. For each successive irrigation, the furrow is made further from the plants, and by mid-season a broad, low bed has been formed, which is covered by the sprawling plants. Between the beds is the dead-furrow which may be used for later irrigations, allowing the water to seep down to the roots without wetting the surface on which vines and fruit are resting.

There are two periods at which water should not be applied—during the period when the first blossoms are open, and during the latter part of the fruit-ripening period. Irrigation at the earlier period will decrease the set of fruit, and at the

* From "Tomato Production in California"—J. T. Rosa—Circ. 263, May 1923, Coll. of Agr., University of Cal.

later period will retard the maturing of the crop. However, in some sections where a late crop is grown for fall shipment, the practice is to irrigate just as the first cluster begins to bloom. This prevents the setting of early fruit and may encourage the development of a larger plant that will produce more late fruit.

Planting Distances.

The planting distance is determined by the variety, the soil, and the season at which the crop is grown. Early tomatoes grown under intensive culture, where the plants are staked and trained to a single stem, as in the Merced district, are set 15 in. by 3 ft. apart, this requiring about 12,000 plants per acre. Early varieties where not staked and pruned, are usually set about 3 by 4 ft., requiring about 3,600 plants per acre. The late shipping and canning crop, the varieties used for which generally make very vigorous vine growth, are set from 6 by 6 ft. to 8 by 8 ft. apart, depending on the locality and soil fertility. This crop then requires from 700 to 1,200 plants per acre.

The wider spacings are more economical of plants and labour than the closer plantings. Yet there is no reliable data available to indicate whether wide or close planting pays best. Certainly the rows must be wide enough to allow cultivation and irrigation, and to permit easy passage for the pickers without trampling upon the plants.

AGRICULTURE IN SOUTHERN QUEENSLAND

A. E. GIBSON, Instructor in Agriculture.*

From the viewpoint of the agriculturist and live stock owner the period under review will go down in the history of the State as one of the "lean" years, and whilst conditions have varied in different portions of the State it will be generally conceded that 1925-26 was well below the average year of prosperity associated with primary production as a whole.

Grain and Root Crops.

The wheat crop in its initial stages met with fairly satisfactory climatic conditions, but late frosts experienced during the critical stages of the wheat plant's life, at which a sudden lowering of temperature to frost readings is calculated to damage its ultimate grain production, had the effect of considerably lessening the expected yield of grain from a large area of the Darling Downs.

Later on when early harvesting was about to commence excessive moisture delayed operations. Late maturing crops, however, benefited to some extent by the rainfall experienced at that period.

Coincidentally these conditions affected the potato crops, causing a considerable amount of second growth to develop. Many crops were thus late in harvesting and were of inferior quality when placed on the market. Sound potatoes of good keeping quality were at a premium on the Brisbane market, and prices rose to £27 per ton for such.

The early months of the present year were remarkable for the low rainfall recorded, to such an extent that the so-called rainy season was noted entirely by its absence. Maize crops sown in the latter part of last year and depending on moisture during the tasselling stages were a failure, and as the result considerable areas of land devoted to this crop were grazed off. Although not a total loss in those dairying districts where cream supplies are considerably augmented for a period by dairy stock being given access to areas of more or less succulent material, at the same time a considerable decrease in the grain production of this State naturally results. Maize values have risen in sympathy, whilst at the same time importations of overseas-grown maize are at present being made by the Southern States.

* In the Annual Report of the Department of Agriculture and Stock.

Fodder Crops.

Many farmers, profiting by their former experiences, provided reservations of fodder, and considerable quantities of silage have been made in many of the dairying districts, particularly in those adjacent to the coastal line. At the same time it is a matter to be regretted that large areas of good, useful material suitable for conversion into ensilage were allowed to go practically to waste.

The attention which this Department has given to the establishment of fodder plots throughout the different areas of the State and the publication of results obtained is undoubtedly bearing fruit. Recent experiences have shown that considerable notice is being taken of articles appearing from time to time in the "Agricultural Journal" dealing with this subject, and several instances have been met where farmers have profited by the information made available and are extending operations in this direction.



PLATE 130.—MR. A. E. GIBSON, INSTRUCTOR IN AGRICULTURE.

It is worthy of note that in a certain district of the southern portion of this State where between some thirty and forty farms have been temporarily abandoned during the past few months (the occupiers thereof being absent with their stock on agistment in more favoured localities) among the few remaining farmers who have not had to purchase fodder or provide for their stock by agistment elsewhere is one who has profited by the information given to him on silage and fodder matters generally. This farmer voiced the opinion that if more attention were given to annually conserving fodder in the form of ensilage, and supplementing these supplies where possible by growing winter fodder crops, very little ill-effects would be felt by the average man on the land from periods of insufficient rainfall.

In furtherance of the Department's policy in this direction, fodder plot trials have again been established—on this occasion the Beaudesert and Canungra districts being chosen as suitable centres for the demonstrations, details of which are appended.

Plots which were established on the farm of Mr. T. Coleman, Toogoolawah, early in last year and sown on 31st March, 1925, were harvested for yields on 30th July, 1925, consequently each yield submitted represents four months' growth of fodder, and judged on this basis alone may be considered as highly satisfactory.

More vigorous growth was noticed in the case of Florence wheat with peas or tares and the skinless barley with similar mixtures, both of which were well out in ear and rapidly maturing. Rye had made a more vigorous growth, but only a few heads were in evidence. Owing to the balance of the plots (six) not having reached their maximum growth as green fodders, comparative cuttings were again made of these on the 26th August, 1925.

The primary cuttings gave the following computed yields:—

					Per Acre.			
					T.	C.	Qr.	Lb.
Cape barley and peas	..	..	..	..	9	11	1	0
Skinless barley and peas	..	..	..	..	10	15	1	12
Rye and peas	..	..	..	..	8	10	1	12
Algerian oats and peas	..	..	..	..	8	3	3	20
Canary seed and peas	..	..	..	..	11	8	0	24
Florence wheat and tares	..	..	..	..	7	4	2	16
Cape barley and tares	..	..	..	..	9	0	0	0
Skinless barley and tares	..	..	..	..	11	1	3	4
Rye and tares	..	..	..	..	12	13	3	20
Algerian oats and tares	..	..	..	..	10	15	1	12
Canary seed and tares	..	..	..	..	8	10	1	12

Secondary cuttings were made of the following on the 24th August, 1925:—

					Per Acre.			
					T.	C.	Qr.	Lb.
Algerian oats and peas	..	..	..	..	11	9	3	12
Rye and peas	..	..	..	..	8	13	2	8
Canary seed and peas	..	..	..	..	7	17	2	0
Rye and tares	..	..	..	..	9	9	2	16
Algerian oats and tares	..	..	..	..	13	19	2	16
Canary seed and tares	..	..	..	..	13	14	0	8

As will be seen, a further growing period of twenty-five days elapsed between the two consecutive cuttings, which resulted in the mixture of Algerian oats and peas yielding an increase of 3 tons 5 cwt. 3 qr. 20 lb. during that period, whilst in the case of the mixtures of Algerian oats and tares the increase amounted to 3 tons 4 cwt. 1 qr. 14 lb., the slight difference being in favour of the mixture of peas and Algerian oats. Owing to field peas maturing much earlier than tares, these figures no doubt would be reversed were further tests made when the tares were more fully matured, and would counteract the over-mature condition (as a green fodder) of the oats.

Compared with these figures are those of the remaining plots:—

—	Harvested 30th July, 1925.				Harvested 24th Aug., 1925.				Decrease.				Increase.			
	Tons cwt. qr. lb.				Tons cwt. qr. lb.				Tons cwt. qr. lb.				Tons cwt. qr. lb.			
Rye and peas	8	10	1	12	8	13	2	8	..	..	..	..	0	3	0	24
Canary seed and peas ..	11	8	0	24	7	17	2	0	3	10	2	24	..	..	..	..
Rye and tares	12	13	3	20	9	9	2	16	3	4	1	4	..	..	..	..
Canary seed and tares ..	8	10	1	12	13	14	0	8	..	..	..	..	5	3	2	24

The above results clearly show the loss which is sustained when fodder crops are allowed to become matured or are dealt with before they reach that stage.

Dairy Fodder Plots at Boat Mountain.

Arrangements were entered into with Mr. F. Barton, of Murgon, on 27th March, 1925, for the establishment of dairy fodder plots on his farm at Boat Mountain. These plots were ultimately sown on the 12th May, 1925, the delay being due to the fact that the amount of cultivation given in the first instance to the areas selected for the trials was deemed insufficient, and subsequent to this matter being

remedied insufficient soil moisture was present for the purpose of ensuring germination. This latter state of affairs remained unaltered until the 9th May, 1925, when a sufficiency of rainfall was experienced and the plots were sown under perfect conditions of tilth and soil moisture on the 12th May, 1925.

The following varieties were sown in plots of one-tenth of an acre each:—

Rye and tares	Rye and peas
Canary seed and tares	Canary seed and peas
Skinless barley and tares	Skinless barley and peas
Cape barley and tares	Cape barley and peas
Algerian oats and tares	Algerian oats and peas
Florence wheat and tares	Florence wheat and peas.

The majority of these plots were computed for yields on 14th October, or a period of 155 days after sowing.

Heavy growth on portion of the area was very noticeable, no doubt due to the fact that it had been fallowed during the early portion of the year.

In all the plots the field peas did remarkably well, making vigorous growth throughout, averaging 3 ft. 3 in. in height. Tares, on the other hand, gave rather poor results, due to their immaturity and slow growth. Rye was backward and had made very little progress, and for purposes of yield was regarded as of no value.

The following are the computed results:—

	T.	C.	Qr.	Lb.
Florence wheat and tares	3	12	1	8
Algerian oats and tares	Not harvested			
Cape barley and tares	5	6	0	18
Skinless barley and tares	4	13	0	24
Canary seed and tares	5	6	0	8
Rye and tares	Not harvested			
Florence wheat and peas	5	14	0	12
Algerian oats and peas	7	14	1	4
Cape barley and peas	5	2	3	12
Skinless barley and peas	6	2	0	16
Canary seed and peas	7	14	1	4
Rye and peas	Not harvested			

These results fall far short of those obtained from the Toogoolawah plots, and may be accounted for by the delay which occurred in connection with the initial preparation of the soil and lack of surface moisture, thereby delaying operations at a most favourable growing period.

Trial Plots at Beaudesert.

Pig and dairy fodder trial plots were arranged for early in the year with Messrs. F. W. Thiedeke, of Beaudesert, and Peel Caswell, of Wangalpong. But owing to the lack of sufficient soil moisture sowing operations were delayed until early in the present month—too late, unfortunately, to give full effect to the trials, but at the same time they will be of instructional value to the surrounding farmers who are interested in the dairying and pig keeping branches of general agriculture.

The following fodders are under trial plots of one-tenth of an acre, and in some instances one-thirteenth of an acre each:—

Pig Fodder Plots.

Thousand-headed kale	Elephant swede turnip
Dwarf Essex rape	Sugar beet
Yellow globe mangels	White Belgian carrot
Long red mangels	Large drumhead cabbage.
Purple-top swede turnips	

Dairy Fodder Plots.

Pilot wheat and peas	Skinless barley and tares
Pilot wheat and tares	Ruakura oats and peas
Florida wheat and peas	Ruakura oats and tares
Florida wheat and tares	Algerian oats and peas
Cape barley and peas	Algerian oats and tares
Cape barley and tares	Rye and peas
Skinless barley and peas	Rye and tares.

Sowing was carried out under ideal conditions of tilth and surface moisture, and given average climatic conditions a rapid growth should result therefrom.

Potato Trials at Toogoolawah.

Following on arrangements made to hold a series of potato trials and the initial preparation of $1\frac{1}{2}$ acre of alluvial land on Mr. T. Coleman's farm at Toogoolawah, twenty-eight varieties of potatoes were planted under ideal conditions on 22nd August, 1925, as follows:—

- | | |
|--------------------------------|--------------------------------|
| 1. Satisfaction | 15. Early Rose |
| 2. Carmen | 16. Factor |
| 3. Scottish Triumph | 17. Cambridge Kidney |
| 4. Up-to-date | 18. Batlow Cross |
| 5. Brownell's Beauty | 19. Dalhousie |
| 6. Coronation | 20. Short's Prolific |
| 7. Manhattan | 21. Gold Jungle |
| 8. Dakota Red | 22. Early Vermont |
| 9. Langworthy | 23. New Era (blight resistant) |
| 10. Premier (blight resistant) | 24. Beauty of Hebron |
| 11. Arran's Comrade | 25. Templar |
| 12. Austers Vermont | 26. Adirondack |
| 13. Redsmooth | 27. Bliss Triumph |
| 14. White Albino | 28. Cook's Favourite. |

The tubers were planted in drills spaced 3 feet 3 inches apart, the land having previously been well ploughed and cultivated, and owing to ample subsurface moisture being available a good germination resulted.

Tubers prior to planting were immersed for one and a-half hour in a solution of formalin 1 pint to 10 gallons.

Spraying was carried out between the 16th and 19th of October, Burgundy mixture being used at a strength of 6 lb. copper sulphate and 5 lb. of washing soda to 40 gallons of water. Frosts were experienced during the latter part of September, but little or no damage to the potatoes was apparent at the time of spraying.

Arrangements had been previously made for a trial of a new form of fungicide now placed on the market under the title of eucal, which is in reality a finely triturated powder consisting of copper sulphate and lime specially treated—the intention being to apply it in dust form, using for the purpose a Pope knapsack dusting machine. It is a Queensland patent, manufactured in Brisbane.

In order to take advantage of any dew or moisture adhering to the leaves of the potato plants, dusting was carried out before sunrise on the 17th of October, but, due to the lack of sufficient moisture, the results obtained from the first trial were not satisfactory.

On the following evening a storm worked up, finalising in a light shower, and advantage was taken of this to apply another dusting on the following morning. On this occasion all conditions were favourable, and a perfect and even application of the dust throughout the foliage of the plants was obtained.

The dusting machine works satisfactorily, is easy to operate, and mechanically is a machine from which a good deal of service could reasonably be expected. As with all forms of dust fungicides, the necessary moisture must be present on the foliage of the plants treated before reasonable results can be obtained. Given these conditions there is no doubt that the "duster" has much in its favour, eliminating as it does the heavy work of transporting the necessary amount of solution, only a portion of which is really effective.

Under dry conditions, however, the spraying of plants with liquids has a reviving effect upon them which is obviously absent in the dusting operation.

The rainfall recorded during the period between planting and harvesting was as follows:—

							Inches.
From 22nd August	..	..	..	..	..	..	0.14
September	..	..	..	..	..	..	0.49
October	..	..	..	..	..	..	0.52
November	..	..	..	..	..	..	3.88
December	..	..	..	..	..	..	3.03
To 12th January	..	..	..	..	..	..	5.01
Total	..	..	..	..	..	..	13.07

Due to the excessive rainfall during the months of December (when the plots should really have been harvested) and January, and to the second growth that resulted therefrom, the keeping qualities of the tubers were seriously impaired, apart

from which the actual work of harvesting the crop was made heavier by reason of the fact that the haulms had not died off, and consequently had to be cut and removed before the potatoes could be satisfactorily dealt with. Owing to the excessive rains the tubers were decidedly sappy and inclined to scald easily if exposed for a short space of time to the sun's rays.

The following weights are the results obtained from the main varieties, 1 cwt. of seed in each instance being planted:—

Main Commercial Varieties.	1st Grade.			2nd Grade.			Seed and Waste.			Total Weight.			Yield per Acre.			
	Cwt.	qr.	lb.	Cwt.	qr.	lb.	Cwt.	qr.	lb.	Cwt.	qr.	lb.	Tons	cwt.	qr.	lb.
Carmens ..	1	0	4	2	1	7	2	3	12	6	0	23	4	15	2	4
Satisfaction ..	1	3	0	0	3	9	2	0	24	4	3	5	2	18	1	2
Scottish Triumph ..	2	3	18	1	3	15	4	0	0	8	3	5	4	13	1	16
Up-to-date ..	3	0	3	3	1	6	4	1	9	10	12	18	3	15	0	26
Brownells ..	3	1	19	2	3	2	4	3	10	11	0	3	5	16	0	2
Coronation ..	0	3	4	2	2	16	3	2	7	8	0	7	4	4	3	26
Manhattan ..	0	3	6	2	0	22	3	2	16	6	3	16	3	10	2	12

The results obtained in the variety tests appear in some instances unduly high and will probably be accounted for by the restricted areas of the plots utilised, the results being confined to those obtained from the planting of three tubers only of each variety.

Variety.							Total Yield.	Yield per Acre.			
							Lb.	Tons.	cwt.	qr.	lb.
Dakota Red ..	..	..	..	..	..	..	21½	7	3	1	0
Langworthy ..	..	..	..	..	..	..	20	6	18	1	19
Premier ..	..	..	..	..	..	..	14½	5	15	2	10
Arrans Comrade ..	..	..	..	..	..	..	16	6	4	0	25
Austers Vermont ..	..	..	..	..	..	..	19	6	3	3	8
Redsnooth ..	..	..	..	..	..	..	10	3	12	2	10
White Albino ..	..	..	..	..	..	..	16½	4	14	0	23
Early Rose ..	..	..	..	..	..	..	35	5	18	1	13
Factor ..	..	..	..	..	..	..	13½	4	3	0	14
Cambridge Kidney ..	..	..	..	..	..	..	33½	12	3	0	19
Batlow Cross ..	..	..	..	..	..	..	15¼	4	19	1	0
Dalhousie ..	..	..	..	..	..	..	39	11	12	0	16
Short's Prolific ..	..	..	..	..	..	..	35	8	0	0	9
Gold Jungle ..	..	..	..	..	..	..	13	4	14	1	13
Early Vermont ..	..	..	..	..	..	..	17	4	1	0	18
New Era ..	..	..	..	..	..	..	2	0	14	2	2
Beauty of Hebron ..	..	..	..	..	..	..	22	4	13	3	26
Templar ..	..	..	..	..	..	..	24½	7	0	2	10
Adirondack ..	..	..	..	..	..	..	25	5	1	1	23
Bliss Triumph ..	..	..	..	..	..	..	13½	4	11	1	7
Cook's Favourite ..	..	..	..	..	..	..	24½	7	2	0	16

No traces of blight were in evidence in any of the potatoes harvested.

Seed reservations of 1 cwt. each of the main commercial varieties were made, but due to the sappy condition of the tubers, brought about by the excessive moisture experienced prior to harvesting, considerable depreciation took place before planting operations for the winter crop were concluded.

Seed was forced and again treated with formalin prior to planting. The area set aside for the winter crop plots had previously been sown with Algerian oats for hay, and the stubbles, together with a generous growth of herbage, were grazed off until the middle of January, when the area was ploughed and cultivated. Unfortunately lack of rainfall between the initial ploughing and the date of planting was not conducive to the conservation of moisture, although every effort had been made by surface cultivation to bring this about, and planting operations were carried out under somewhat unfavourable conditions. In view of the state of the seed, however, it was deemed advisable to take the chance of sufficient rainfall being experienced to carry the crop to maturity, consequently planting was finished by the first week in March.

The main commercial varieties were replanted with the exception of Satisfaction, the seed of which was deemed unsuitable. Similarly the variety trials were carried out under winter conditions, but two varieties (Early Rose and New Era) were omitted, being also deemed unsuitable.

Reports since received stated that in most of the varieties the plants were holding their own and small tubers were forming. Recent rains if unaccompanied by frosts should have a beneficial effect.

Wheat Trials in the Southern Burnett.

With the object of determining the suitability or otherwise of a number of new wheats bred at Roma State Farm, side by side with a few standard varieties, comparative trials both in the field and under experimental plot conditions were carried out by arrangement last season with Mr. F. Gustafson, of Murgon. The soil chosen was typical of the red volcanic friable loams of the district, and the farm prior to cultivation was partly forest and partly scrub country. Special attention was given in the preparation of the land to keeping the surface in a well worked condition, consequently when the wheat was sown on the 28th and 29th of May an excellent strike was obtained. Harvesting took place on the 1st and 2nd November, 157 days from date of planting.

Rainfall records were—June, 3.12 inches; July, 0.69 inches; August, 2.09 inches; September, 1.45 inches; October, nil. Total, 7.35 inches.

The commercial varieties of wheat used were—Amby, Bunge No. 1, Canberra, Gluyas, Pusa 4. Roma bred wheats—Waterman, Watchman, Redman, Red Chief, Ringer, Radio, Redskin, Amber, Florida, Warrior, Amberite, Marco, Beewar, Pinto, Cedric, Polo, Bindie, Ruby, Pilot, Three Seas, Pacific, Buffalo.

Three-acre propagation plots of Pilot and Florida were also planted. The other varieties planted by Mr. Gustafson were Gluyas 6 acres, Florence 6 acres, Currawa 3 acres, Roma Red 3 acres, Pusa No. 4, 3 acres.

As the conditions under which the wheats were grown proved favourable, the growth and development of individual varieties was exceptionally good, the straw ranging from 4 to 5 feet in height and carrying well-developed ears. The results from the field plots showed that when land is well prepared and suitable varieties chosen good yields in average seasons may be expected. Florence returned 40 bushels, Florida 37 bushels, Pilot 33½ bushels, Pusa No. 4 and Roma Red 18 bushels each, and Gluyas 15 bushels per acre respectively.

Although some of the yields were undoubtedly good, the clean, well-grown, and attractive-looking crops were most promising from a hay point of view. Obviously farmers in this part of the State might well turn their attention to a dual-purpose crop, invaluable in such an important dairying and mixed farming centre.

That past experience has impressed upon farmers the necessity of conserving fodder is emphasised by the amount of correspondence dealt with relative to the construction of silos, the manufacture of silage, and the class of crops recommended for fodder purposes under different soil and climatic conditions. It is regretted, however, that greater use is not made by dairy farmers generally of the facilities available within the Department in connection with the erection of silos and the making of ensilage.

A stack silage demonstration that was given on the Wunulla Estate, situated in the Kileoy district, attracted a considerable amount of local interest, and it is understood that as a result of this particular demonstration other stacks were built in the district shortly afterwards.

In furtherance of the scheme for the standardisation of wheat varieties in Queensland arrangements were made in conjunction with a member of the Wheat Board for pure seed propagation areas at Kaimkillenbun, Bell, and Jandowae, certain farms being specially selected for the sites of these pure seed areas.

Owing to the depredations of the banded pumpkin beetle in the Allora district having made the growing of pumpkins as a farm crop a matter of difficulty, if not an impossibility, a demonstration was arranged for on the farm of Mr. G. Black at Goomburra, and the method of control as suggested by this Department practically illustrated. Beyond the use of certain repellants in a few isolated instances, nothing had been attempted in the direction of insect destruction by either spraying, dusting, or any other means of distributing poisons, consequently the beetles had had uninterrupted opportunities for increasing their numbers.

Owing to the lateness of the season the methods advocated—the use of arsenical preparations in dust form—could not be generally adopted, but it is reasonable to suppose that combative means will be employed by growers of pumpkins in this district in respect to future crops.

AGRICULTURE IN NORTH QUEENSLAND.

By N. A. R. POLLOCK, Instructor in Agriculture.*

The year from 1st July, 1925, to 30th June, 1926, has been remarkable for the generally poor rainfall experienced in most districts of the Northern Division. An inspection of the monthly rain map shows that in six of the months the rainfall over the whole of the division was much under the average, while in the other six months only odd centres experienced slightly over an average fall, but almost the whole of the pastoral areas had much less than the average fall in every month of this year as well as in the last three months of last year. Except in the districts of heavy average rainfall, the conditions have been those of a severe drought such as have been characterised as the worst for at least forty years.

The pastoralists on the eastern coastal slopes with cattle have suffered much loss, but those with sheep on the Western rolling downs have felt the lack of rain and consequent shortage of pasturage most severely, their losses by death in many instances being heavy, while the expenditure in railing the sheep away to relief country, the cost of agistment and purchased feed either away or at home, has been so costly that in many instances it has exceeded the value of the sheep so far saved. Without relieving rains before the usual storms can be expected in November or December, these stockowners must be put to such a heavy expense in the purchase of feed as to seriously diminish their financial resources if not to run them heavily into debt.

While numbers of sheep are on grassed relief country in the Gulf districts, which is not expected to hold out for very long, others are depasturing on the eastern coast, and many are being fed on the sugar areas, notably the Lower Burdekin, by arrangement with canegrowers, who supply "chop chop" (chaffed cane tops or cane stalks) at a cost of £4 per ton delivered at the feeding troughs. The result of this feeding seems to be satisfactory, as the sheep appear to be more than holding their own.

On the holdings where the sheep are fed, maize and linseed oil cake are the feeds mainly used, for though hay in some cases was secured the congestion on the railway through the increased traffic in shifting starving sheep and in transporting fodder prevented the necessary prompt delivery of sufficient quantities of such a bulky food to render it popular. Some losses in sheep with symptoms of poisoning have occurred in odd cases where linseed oil cake only was fed. It is known that occasionally this product contains a hydrocyanic acid-yielding glucoside, so it is probable that sheep poisoned thereby have secured more of the feed than was intended.

Usually a daily allowance of from 6 to 9 oz. per sheep is made when feeding with either the oil cake, the balance of the ration being made up with the grass eaten.

Either maize or oil cake alone with the dry grass provides an unbalanced ration. The most economical feed with the material available would appear to be a mixture of one to two parts of oil cake to eight or ten parts of maize, especially as the landed cost of maize is less than that of oil cake.

As an aid against impaction, some of the experienced graziers are giving a lick made up mainly with linseed meal and salt. The hand-feeding of sheep represents a daily expenditure of from £4 to £5 at least per 1,000 head, consequent on which any prolonged period of hand-feeding, without allowing for deaths, must overtake, if not exceed, the present value of the animals. In addition to the heavy losses on the year's transactions by the death of sheep, and the expenditure in purchasing feed and transporting to other parts, the owners will experience a lower price for their wool clip, the quality of which will reflect the droughty season in which it was grown.

In strong contrast to the previous year, when cattle were fat in large numbers early in the season, and the meatworks had a long killing season, the supply of fats this year was very small, resulting in a short killing period of eight to ten weeks at three of the Northern meatworks, while the other two did not operate at all.

Fodder Conservation.

From time to time opportunity has been taken, both orally and by articles in the "Agricultural Journal" and the Press, to stress the necessity for the conservation of fodder as hay or silage in anticipation of a period of shortage that is bound to occur sooner or later. While some increase in that direction has been observed, chiefly amongst the smaller stockowners, the larger holders with few exceptions have studiously neglected the practice. It is needless to refer to the benefit that would have been experienced by stockowners had there been stores of conserved fodder on their holdings this year. All are fully seized of that fact, as they have been in other

*In the Annual Report of the Department of Agriculture and Stock.

recent periods of shortage, when many determined, as doubtless they are doing now, never to be caught again. Yet, it is safe to say, when good rains come and the country is covered with an abundant growth of valuable grasses the big majority will decide that there is going to be a run of good seasons, and there will be plenty of time in a year or two to build the haystacks and erect the silos.

A tour of the Rolling Downs convinces one that with the thousands of acres on every holding, large or small, on which hardly a stick or stone can be found to hinder harvesting operations, there is no reasonable excuse for the neglect to make hay. It is true that, owing to the tussocky nature of the "Downs Mitchell," the first cutting of the grass cannot be made as close to the ground as might be desired, equally true that no very great quantity can be cut off the average acre, yet it will be conceded that in ordinary seasons half a ton of hay to the acre can be obtained. To put up a stack of 100 tons consequently 200 acres must be cut, say an area of 40 chains by 50 chains. By placing the stack in the centre it will mean that the greatest distance the hay need be transported to the stack will be 25 chains. Using modern machinery, I am of opinion such a stack could be put up at a cost not exceeding 20s. per ton. Labour experienced in stack building and thatching is scarce, but will be available if the demand exists. Thatch for stacks is suggested in the bulrushes growing on so many bore drains, while cane grass in places is plentiful. Failing any natural grown material, a cultivated patch of sudan grass would provide abundance. In addition to hay from the natural grasses, large quantities of sudan grass or other species of the sorghum family could be grown under cultivation, the former for hay and the latter for ensiling, under the rainfall of an ordinary wet season, or, for that matter, under irrigation by bore water at another time.

Though the soil on these rolling downs is of a clayey nature, it is capable of being reduced to a fine tilth, and is just such a soil as would be very suitable for wheat if seasonal conditions would allow.

The storage of fodder as silage necessitates the erection of overground silos, since the depth of soil is insufficient and the rock underlying it too hard to permit of receptacles being excavated with economy. The general absence of sand is a drawback to the construction of reinforced concrete silos, but it is thought by pulverising the stone procurable in practically every holding a suitable aggregate could be secured. Pise, for which the soil appears remarkably suited, suggests itself as a possible material for cylindrical silo construction if the walls were reinforced and made sufficiently thick. Without practical experience in this direction, however, such material could not well be recommended.

Silage for Sheep.

Apart from the value of conserved fodder as hay or silage in periods of shortage, the value of such a succulent fodder as silage when fed to ewes and rams just prior to and at the time of mating, say during September, October, and November, when the pasture is usually very dry, will be evidenced in the increase of the lambing percentage and general wellbeing of the sheep.

While instruction in cultural matters and conservation of fodder, &c., is provided by the State, and a certain amount of propaganda work has been done, it is not thought that the results to be achieved by this means will ever be very satisfactory.

To overcome the natural inclination of people to follow the line of least resistance, it is suggested that some inducement might be held out to influence them to make provision for bad times. Compulsion is ever unpopular, and though conditions may be inserted in leases insisting on fodder conservation, it is thought that, as remarked in my last annual report, a provision for the remission of a portion of the rental, consequent on the annual storage of prescribed quantities of fodder, would be welcomed and result in the desired objective being attained.

Crops in General and Experimental Work.

As might be expected with the paucity of rainfall, agricultural production was reduced in many districts, notably in the Charters Towers and Gilbert River districts, where the crops were total failures except where irrigation was practised in odd instances in the former district. The coastal districts fared somewhat better, but production there was lower than usual even under irrigation, as in the Bowen and Lower Burdekin districts.

The district that stood out above all others in production was the Atherton Tableland, where the rainfall, above the average for January and lower for the other months, was all in favour of the maize and other summer crops.

Maize.

The Atherton Tableland, though the only district of the North producing a large quantity of maize, gains the record each year for the highest average yield per acre of any district in the State in which upwards of 10,000 acres are put under crop. Seasonal conditions this year were excellent, as there was sufficient rain during the growing period, with bright sunny days for the most part when the grain was filling and ripening in place of the continuous drizzling rain usual in the latter period. As a consequence, damage from fungus disease (moulds, &c.) was slight, the quality of the grain being absolutely prime. This year a larger acreage than usual was placed under crop, which, under the favourable seasonal conditions experienced, should enable the district to reach the million bushel output, not previously attained. The appearance of the crop and the results shown during the progress of the harvest point to an average in the vicinity of 50 bushels per acre being obtained over the whole district.

In the early part of the year, during which the harvest of last year's crop, grown under a heavy rainfall, was being concluded, much discussion took place regarding the inferior quality of the grain as well as the lower average yield being obtained, many holding that depletion of the elements of plant food in the soil was the cause of lower average yields as well as being a contributing cause of the prevalence of disease affecting the grain. An article, "Tableland Maize," published in the "Queensland Agricultural Journal" for October, explained that diminishing yields and poor quality in the grain were entirely due to the use of a variety or strain of several varieties that were not suited to withstand the excessively humid conditions prevalent during the period of ripening and drying off, and also to the lack of sufficient care in the selection of seed. Recent analyses of the soil from farms where maize has been an annual crop for many years, in one case for nearly thirty years, as well as the result of present crops, show that the elements of fertility have not been depleted even on the oldest cultivation to such an extent as to seriously interfere with production, while the prime quality of the grain in the present crop emphasises the conclusion that disease will be overcome by the use of a variety suited to the climate.

In this latter connection, satisfaction amongst growers is expressed at the Department's action in making arrangements for the propagation and supply of pure selected seed of a resistant variety.

Fertiliser Experiments on Maize.

Trials with various fertilisers have been carried out each year for several years past both on forest and scrub soils. But though the trials on the forest soil have consistently demonstrated the greatest profit to be obtainable from the use of superphosphate alone, those on the scrub soils have given no definite indication of the value of any one fertiliser or mixture of fertilisers, even where relatively large amounts have been applied. During the year three experiments were finalised on the previous year's crop, the results of which were published in the article "Tableland Maize." Owing to the favourable season, it was possible to record two of the three trials undertaken with this year's crop in time for inclusion in this report. In these trials the fertilisers were applied on land on which burnt lime at the rate of 10 cwt. to the acre had been broadcasted as well as on the land to which no lime had been applied.

Fertiliser applications were at the following rates per acre:—

Plot.			Superphosphate.	Meatworks.	Nauru Phosphate.	Sul. Pot	Sulp. Am.	Filler.	Total and Cost per Acre.		
			Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	s.	d.
1	..	..	180	..	..	..	..	20	200	14	6
2	..	..	..	180	..	..	..	20	200	17	2
3	..	..	..	..	180	..	..	20	200	16	6
4	..	..	90	90	..	..	..	20	200	15	9
5	..	..	Control	No manure	..	..	..	..	..	..	..
6	..	..	..	180	..	20	..	..	200	20	3
7	..	..	..	..	180	20	..	..	200	19	6
8	..	..	..	180	..	20	30	20	250	26	0
9	..	..	..	..	180	20	30	20	250	25	3
10	..	..	120	120	..	30	30	..	300	31	4

It may be noted that filler was used in order to facilitate an even application. The results expressed in acre yields were:—

Plot.					WITH LIME.		WITHOUT LIME.	
					Scrub Soil.	Forest Soil.	Scrub Soil.	Forest Soil.
					Bus. lb.	Bus. lb.	Bus. lb.	Bus. lb.
1	..	..	..	..	53 0	71 54	41 6	64 50
2	..	..	..	..	55 24	60 34	54 34	59 36
3	..	..	..	..	59 12	62 8	45 24	57 34
4	..	..	..	..	57 32	59 20	34 50	53 18
5	..	..	..	..	48 52	53 52	40 2	54 40
6	..	..	..	..	50 16	55 14	43 30	58 30
7	..	..	..	..	49 12	56 20	40 32	63 34
8	..	..	..	..	49 42	57 10	36 44	64 18
9	..	..	..	..	48 34	57 10	40 16	67 12
10	..	..	..	..	50 16	57 40	37 32	63 28

Samples of the respective soils were analysed by the Agricultural Chemist, showing the scrub soil to contain slightly greater quantities of nitrogen as well as of available potash, phosphoric acid, and lime. According to the analyses, it was to be expected that the yields of the plots on the scrub soil should be equal to, if not greater than, those on the forest soil when grown under similar seasonal conditions. The scrub soil gives an alkaline reaction, while the forest soil gives an acid reaction, but any influence in this direction is discounted by the higher yield on the alkaline soil where lime was applied. Similar disparities in the yields from the plots this year on scrub soil occur in each of the trials made in previous years, viewing which, one is inclined to the belief that the very variable and indecisive results of all fertiliser applications so far on the scrub soils are due to some condition of the soil not revealed in the analysis, possibly in connection with bacterial action that does not obtain in the forest soil.

Maize Harvester.

The enterprise of the Faichney Brothers, Soldier Settlement, Kairi, is reflected in the importation of a maize picker and husker, which has since been doing very satisfactory work picking and husking the cobs at the rate of an acre per hour at a cost of 1s. 1d. for oil and fuel on maize crops at Kairi. The machine is a somewhat bulky implement, being about 12 feet wide, and weighs about 29 cwt., and is drawn by a tractor which also operates the machinery by power applied from the differential by a series of shafts connected by universal joints to the harvester. Provision is made also, in case the machine is horse-drawn, for power to be transmitted by chains from the large rear pair of wheels.

In operation the maize stalks are gathered between two jaws and guided by spiked endless chains called gatherers to two snapping rollers, between which the stalks pass until the cob is reached, when the latter is thrown off into an elevator which conveys it to the back of the machine, from which it drops into the husking rolls, against which the cobs are kept in position by moving guides until the husk is removed and carried through the rolls and dropped on the ground as the balance of the stalk is, after the cob has been removed, while the husked cob is dropped into another elevator and delivered into a wagon that can either be drawn by horses or by the tractor working the machine. Messrs. Faichney express themselves as well pleased with the work so far done with the machine.

Potatoes.

The publication of the results of the comparative trials of potato varieties carried out by the department in different centres on the Tableland and coastal districts last year has commanded much attention and resulted in a very much increased acreage being put under crop in the Northern Division during the year, both on the Tableland and coast. The lower prices realised last season for sugar-cane consequent on over-production directed the attention of many cane farmers to other crops which might be considered to return a good profit, and many have placed areas under potatoes. It is confidently expected that the acreage under potatoes this year in the North will be greater than in any previous year, and that each succeeding year will see a further increase.

In my last Annual Report the yields of ten varieties grown on the Tableland in two centres were recorded and mention was made therein of the seed from these trials being planted at Pentland and Woodstock respectively. The yields of these latter trials were, at per acre:—

Variety.	Pentland.				Small. Per cent.	Woodstock.				Small. Per cent.
	T. cwt.	qr.	lb.			T. cwt.	qr.	lb.		
Up-to-date	7	1	1	20	6	12	18	1	5	5
Scottish Triumph	6	8	1	26	6	11	4	3	26	7
Coronation	4	17	0	26	4	14	19	0	11	4
Carmen No. 1	3	7	3	2	12	8	10	0	17	5
Carmen No. 3	4	8	2	20	10	8	19	0	18	6
Clark's Main Crop	2	6	1	12	15	9	1	3	19	10
Manistee	2	15	3	26	11	8	2	3	23	4
Victory	3	12	2	20	8	5	17	3	22	6
Early Rose	1	11	2	14	19	2	5	3	19	14
Sussex Red	Failure					Failure				

These results must be regarded as very satisfactory, the yields at Woodstock, where the soil (alluvial from Major's Creek) was rich and season good, being exceptionally fine.

Seed from these plots was planted on the Tableland for the main crop grown there in the summer months, with Brownell seed from the coast replacing Sussex Red, and gave the following yields, at per acre:—

Variety.	Tolga.				Small. Per cent.	Evelyn.				Small. Per cent.
	T. cwt.	qr.	lb.			T. cwt.	qr.	lb.		
Up-to-date	4	16	1	0	22.4	4	0	2	4	10.7
Scottish Triumph	3	14	2	16	33.2	Failure				..
Coronation	4	10	1	2	9.4	3	15	2	14	14.5
Carmen No. 1	4	4	1	24	11.5	3	12	2	20	11.0
Carmen No. 3	5	8	0	4	7.2	3	18	2	8	12.5
Clark's Main Crop	4	19	0	22	27.0	3	8	3	0	20.0
Manistee	4	0	2	4	17.0	2	9	0	12	20.0
Victory	6	1	3	4	6.0	5	2	0	16	9.6
Early Rose	Failure				..	Failure				..
Brownell Beauty	3	4	3	8	27.2	2	1	1	0	28.1

These yields are not so satisfactory as those obtained in the case of Up-to-Dates and Carmens, grown alongside the plots, the seed for which was brought from Victoria. The percentage of small or unsaleable potatoes in many of the varieties is also unduly high. The adage "Plant potatoes grown in a colder climate rather than in a warmer" appears to be exemplified. Seed from these plots is being tried again on the coast this season, the result of which will not be available for some months to come. In comparison with previous trials, Up-to-Date and Carmen justify their reputation as consistently good yielders, while Victory and Coronation have done very well. Victory is a very promising variety for the Tablelands, the tubers produced there being of nice size and shape, while the quantity of small and unsaleable potatoes was lowest of all. Advantage was taken of an opportunity to secure small lots of seed of further varieties at the Brisbane Exhibition last year, which were planted on the Tableland, to secure seed for comparative trials. Being limited to a few plants of each variety, a comparison of yields was not considered of value, but the yield of several varieties gives an indication of their suitability for the North.

In addition to these varieties, numbering 59, a little seed of 9 other varieties was later secured from Tasmania, thus making 68 varieties, which have been planted in three different coastal and one inland district in quantities sufficient to give some comparison in yield and to provide seed for trials on the Tableland during the approaching summer.

The Tableland crops harvested during the year have given exceptionally good yields, which with the high price secured, £20-£24 per ton, have made them very remunerative. One grower who followed Departmental advice has netted in the neighbourhood of £1,000 from a crop of about 10 acres. It is very satisfactory to note that, especially amongst new growers, Departmental advice in regard to treatment of seed prior to planting and the spraying of the foliage during growth has been largely followed, in all cases with the result of clean crops.

Instances of the presence of potato moth in seed secured from the South have been reported from Proserpine and the Tableland, evincing the need for a more rigorous inspection at the points of entry into the State.

Rice.

Australia each year imports practically the whole of the rice consumed within its boundaries, and thereby sends to foreign countries much wealth that should be produced within the States, of which Queensland climatically is the most suitable. The Department has conducted trials over a good many years, chiefly on the Tableland, with encouraging results in yield and quality of grain. This year further trials were made both there and in several coastal districts. The crop on the Tableland failed owing to want of rain just prior to and after the flowering period, but in two of the coastal districts excellent results were secured with four Japanese Upland varieties which mature in four months, while failures resulted from want of sufficient rain with three Javanese varieties which require six months in which to mature. The following yields were recorded on the Departmental plots at Mr. M. Boyle's farm, Carruchan, Cardwell district, and Mr. C. Daybell's farm, Waterson, Proserpine district. A bushel of paddy or rough rice is calculated at 48 lb.:—

Variety.	Mr. Boyle's Farm, Cardwell.	Mr. Daybell's Farm, Proserpine.
	Per acre. Bush. lb.	Per acre. Bush. lb.
Kirishima	50 20	50 4
Sensho	57 14	55 0
Owari	37 39	48 1
Tamasari	48 6	48 1
Si Rosaki	Failure	Failure
Si Lading	Failure	Failure
Gading Kaloewang	Failure	Failure

Reports from other farmers who experimented with small lots at Clump Point, Nerada, and the Bloomfield River speak very encouragingly of the behaviour of the Japanese varieties under the adverse weather conditions, which on the Bloomfield River were described as the worst for forty years.

There are large areas suitable for rice culture in the coastal districts of high average rainfall, such as from Mackay to Proserpine and from Ingham to Cooktown.

Lowland rice, which requires to be grown in water that is slowly flowing or renewed every eight or ten days, yields a much heavier average crop than the Upland rice, and should be a staple crop in the North and other parts of Queensland where large areas of level country with a retentive subsoil capable of being irrigated occur, such as at Proserpine and Ingham, on the eastern coast, and on the Gregory River, in the Gulf district. It is regretted that, owing to want of facilities for flooding, small experimental trials of varieties of Lowland rice cannot be carried out, but the yields of these Upland varieties gives an indication as to the profit that might be derived from their cultivation, more especially if rice hulling and dressing machinery were available locally.

In addition to the profitable yield of grain, the Upland rice makes a palatable and nutritious hay which is relished by all kinds of stock.

Tomatoes.

The tomato crop, which is the most important one in the Bowen district, engaging as it does the attention of the majority of farmers there, with the now universal use of wilt-resistant varieties, in the past season again gave a very large yield, but owing to fewer boats calling at the port, and the railway strike when the crops were yielding the heaviest pickings, the recorded yield for the district will

be something like 100,000 cases (half-bushel) less than in the preceding year, which gave the record yield. The harvest of tomatoes in the Northern Coastal District commences in May and extends to October, the plants for the first pickings in May being set out in February, and from then onward for the later pickings until July, those for the main crop marketed from July onward being usually set out in May or early June.

Seasonal conditions for 1926 have not been very favourable at Bowen, as insufficient rain has fallen so far, but though the yield has been less the quality of the fruit has been excellent. A fall of a couple of inches of rain during the next month will assure the success of the main crop.

The success attendant on the introduction of the wilt-resistant varieties, especially of those Departmental productions Denisonia and Bowen Buckeye, has induced farmers in other districts to engage in the industry, especially in the Cardwell and Innisfail districts, where the crop has proved most successful.

The arrangement with Mr. J. T. Moore at Bowen to grow the stud plots under Departmental supervision on his farm for the purpose of pure seed supply by Mr. Moore is working admirably.

Comparative trials carried out last season (in which the plants were manured with a fertiliser made up by mixing 40 lb. superphosphate, 15 lb. sulphate of potash, 35 lb. sulphate of ammonia, and 10 lb. of filler (lime carbonate) to constitute 100 lb., at the rate of 195 lb. per acre, which gave the best return in fertiliser trials the previous year) gave the following yields. Ten plants in each variety were set apart, from which pickings were made between 27th June and 26th September:—

Variety.	Yield.	Average pounds per plant.	Pounds per acre.	Cases per acre esti- mated.
	Lb.			
Denisonia	644 $\frac{1}{2}$	64.45	33,514	1,396
Bowen Buckeye	564 $\frac{1}{2}$	56.45	29,354	1,223
Norton	417 $\frac{1}{2}$	41.75	21,710	904
Norduke	373 $\frac{1}{2}$	37.35	19,422	809
Roselawn Buckeye	371 $\frac{1}{2}$	37.15	19,318	804
Columbia	318 $\frac{1}{2}$	31.85	15,560	690

After the fifth picking one plant of the Roselawn Buckeye died, the pickings thereafter being from nine plants only.

The publication of these results in the "Queensland Agricultural Journal" has resulted in inquiries for seed from all over Australia, from New Zealand, Papua, Pacific Islands, North Borneo, Ceylon, South Africa, and the United States, thus showing an appreciation of Departmental work, which is gratifying.

Cigar Leaf.

The growth of cigar leaf in the North, which has been undertaken chiefly in the Bowen and Proserpine districts, has had a serious setback this year owing to the low prices received, together with the adverse remarks made on the quality of the leaf, when marketed between January and March of this year. All growers complain that when they marketed the first portion of the crop in August and September the prices obtained were satisfactory, while no adverse comment was made on its quality. Later in the year, when they marketed the remainder, which was harvested and cured at the same time as the first and was of exactly similar quality, the price was dropped to half of that given previously, while the quality, previously considered satisfactory, was condemned. They feel, consequently, that they have been unfairly treated, and have intimated that unless assured of better treatment they will not give further consideration to the crop.

The marketing of cigar leaf has ever been unsatisfactory to growers, since buyers appear to be unwilling to purchase except through one particular firm in Melbourne.

There is no doubt that cigar leaf of excellent quality can be grown and cured in North Queensland, and that its growth, if not manufacture, should be a profitable industry in many parts, but until concerted action is taken by growers, such as

is possible under the Pools Act, and assistance is rendered by the State in the appointment of a curing expert, whereby the whole of the output could be marketed in standard grades, the position will not be altered.

Cotton.

Interest in cotton as a crop has died out in most Northern districts. In the Bowen district one grower expressed satisfaction with his return from the crop; at Kennedy Creek, in the Cardwell district, two settlers are growing a little, but are not very enthusiastic. At Carbeen, on the driest area of the Tableland, two growers have areas of over 20 acres each under crop, the return from which they consider will be satisfactory, while next year a third grower will operate on a block of land he has purchased for that purpose.

Soil and climate at Carbeen are well suited to this crop, and there is a considerable area of Crown lands still available for settlement from there towards Parada and Mareeba.

At Charters Towers, as predicted in my last Annual Report, the cotton-growing company, who experienced great trouble in the harvesting of their crop, have gone out of business, and no attempt was made to grow the crop by anyone in that district this year.

At Gilbert River, one grower who had encouraging results in yield and quality of cotton last year reports a total loss of this year's crop owing to lack of rain.

Green Fodder Crops and Legumes.

Experimental and demonstration plots of green fodders were almost total failures throughout the year in all districts except those of the Atherton Tableland. Seed selection areas where planted have largely been failures, while in many cases sowings were held back waiting for the rain that did not come. A great deal of interest is maintained on the Tableland in the departmental plots, of which a series fronting the main road out from Atherton attracted much attention.

Though in some cases on the Tableland the growth on the plots of summer feeds was eaten down by caterpillars, the general yields were very fine throughout the year.

As in demonstration plots the farmers were encouraged to graze off and cut and feed in the early stages of growth, records of yields were not possible in many cases, and when made were necessarily at different stages of growth which, although not showing in all cases the maximum yield that could be obtained, provided much useful and interesting data.

CROPS FOR WINTER FEEDS.

District.	Yield per acre.				Sown.	Estimated.
	T.	cwt.	qr.	lb.		
FLORENCE WHEAT.						
Atherton	4	16	1	20	3 May	5 Aug.
Atherton	2	17	3	12	12 June	13 Sept.
Peeramon	8	17	0	0	6 June	28 Aug.
Evelyn	3	7	2	0	18 June	31 Aug.
Evelyn	5	10	3	16	18 June	29 Sept.
Malanda	9	3	0	24	23 May	28 Aug.
THREE SEAS WHEAT.						
Atherton	6	8	2	8	3 May	5 Aug.
Atherton	3	4	1	4	9 June	8 Sept.
Atherton	2	14	2	16	12 June	13 Sept.
Kulara	5	18	3	20	6 June	28 Aug.
Malanda	5	2	3	12	20 June	16 Sept.
Peeramon	6	10	0	20	6 June	28 Aug.
SE x W8 WHEAT.						
Atherton	4	16	1	20	3 May	5 Aug.
Atherton	2	14	2	16	9 June	8 Sept.
Atherton	2	11	1	20	15 June	8 Sept.
Peeramon	6	10	0	20	6 June	28 Aug.
Malanda	2	14	2	16	20 June	16 Sept.

CROP FOR WINTER FEEDS—*continued.*

District.	Yield per acre.				Sown.	Estimated.
	T.	cwt.	qr.	lb.		
SKINLESS BARLEY.						
Malanda	9	3	0	24	24 May	28 Aug.
Millaa Millaa	3	17	2	20	21 May	29 July
Millaa Millaa	4	13	0	24	21 May	8 Aug.
Evelyn	6	5	1	12	18 June	31 Aug.
Evelyn	7	1	1	20	18 June	29 Sept.
CAPE BARLEY.						
Atherton	2	17	3	12	15 June	8 Sept.
FIELD PEAS.						
Atherton—						
Dun	6	8	2	8	3 May	6 Aug.
Partridge	4	19	2	16	3 May	6 Aug.
Millaa Millaa—						
Partridge	10	2	2	0	12 May	29 Aug.
GOLDEN VETCHES.						
Millaa	6	15	0	0	12 May	29 Aug.
SKINLESS BARLEY, GOLDEN VETCHES, AND PARTRIDGE PEAS.						
Peeramon	5	6	3	5	7 May	27 Aug.
SUMMER GREEN FEEDS.						
PEARL MILLET.						
Tolga	19	5	2	23	17 Dec.	4 Feb.
Kulara	38	11	1	20	15 Dec.	17 Feb.
Malanda	19	9	0	0	15 Dec.	15 Feb.
Moregatta	10	2	2	0	16 Nov.	26 Jan.
Ravenshoe	22	7	0	0	23 Dec.	4 Mar.
Ravenshoe	23	11	0	0	23 Dec.	4 Mar.
TEOSINTE.						
Millaa Millaa	16	12	0	0	2 Nov.	3 Mar.
Moregatta	14	5	0	0	16 Nov.	26 Jan.
Ravenshoe	16	0	0	0	23 Dec.	4 Mar.
SIBERIAN MILLET (White Panicum).						
Kulara	20	14	2	16	15 Dec.	17 Feb.
Malanda	18	12	3	12	17 Dec.	15 Feb.
Millaa Millaa	15	5	0	0	2 Nov.	3 Mar.
Ravenshoe	13	8	0	0	23 Dec.	4 Mar.
HORSE GRAM.						
Millaa Millaa	9	15	0	0	2 Nov.	3 Mar.
COW PEA VARIETIES.						
Millaa Millaa—						
Groit	14	0	0	0	2 Nov.	3 Mar.
Brabham	14	12	0	0	2 Nov.	3 Mar.
Malanda—						
Groit	6	0	0	0	18 Dec.	10 Mar.
Brabham	6	9	2	16	18 Dec.	10 Mar.
Victor	7	5	1	12	18 Dec.	10 Mar.
VELVET BEANS.						
Millaa Millaa—						
E. Black	18	0	0	0	2 Nov.	3 Mar.
E. Georgia	14	9	0	0	2 Nov.	3 Mar.
Mauritius	11	5	0	0	2 Nov.	3 Mar.

The value of winter green feeds is well indicated in a report from Messrs. Lowry Bros., of Malanda, who had 5 acres under crop. The additional returns in butter from their herd of 50 cows, most of which were approaching the end of the lactation period, for the fifty days, from 14th August to 3rd October, during which they were fed from the plots, were equivalent to £46 5s. factory payment. The increased return was calculated as that above the average daily return for the first fourteen days of August, no allowance being made for what would have been a natural decrease had they been grazed on the pasturage alone. Writing on the 15th October, Messrs. Lowry state:

“We have since the 3rd October ceased to feed from the plots and have five fresh cows in. We have a tip-top paddock with three mixed grasses—viz., paspalum, couch, and panicum (muticum)—which has been spelled for over six months, and the grass is 6 to 8 in. high all over the 75 acres. Since the 3rd October our cows have been running in this paddock; on the 5th October they dropped 15 gallons per day, and by the end of the week had dropped 25 gallons per day in their milk yield, despite the fact that five fresh cows had been added to the herd in milk.”

Figures like these are illuminating, and it is a matter of regret that other dairy farmers do not make similar calculations.

The yields of summer green fodders as well as those for winter are very fine, and speak volumes for the fertility of the soil and the excellent seasonal conditions of the Tableland.

Some doubt was expressed as to the value of green feeds in summer when there was such a fine growth of paspalum and other grasses, but those who followed the advice to graze or cut and feed them off in the young stages of growth have been amazed at the increase in the milk flow. Pearl millet and Siberian millet (white panicum) have earned golden opinions, while teosinte has been found to be most useful and palatable to stock in this, the first year in which crops were obtained, owing to defective germination in the seed supplied during the previous years.

The legumes for summer growing show excellent results. Their value is very high, as at any stage of growth they may be fed to improve, by their admixture, the nutritive ratio of the pasturage or of other crops.

Honey Sorgho.

Since the first trial of this variety of saccharine or fodder sorghum in 1924, the yields have been consistently high, as the following records show:—

Year.	District.	Per Acre.			
		T.	cwt.	qr.	lb.
1924	Carbeen	25	5	2	24
1925	Carbeen	31	16	1	20
1925	Carbeen	33	15	2	24
1926	Atherton	25	0	0	0
1926	Proserpine	34	9	1	24

It is a variety, as its name indicates, with a high sugar content, very much relished by all kinds of stock, and is likely to exceed the saccharine variety in public favour.

Pasture Improvement.

In my last Annual Report some remarks were made on the subject of the resuscitation or renewal of paspalum pasturage that had become decadent after being laid down for a number of years, the opinion being expressed that a ploughing up of the pasture was at once the best and most economical means of overcoming the trouble, and that as far as the Atherton soils were concerned it was not thought, owing to their fertility, that the application of fertilisers would be followed with any economic result.

During the year, by arrangement with Messrs. Pink and Sons, a series of experiments were undertaken on 2 acres of a pasture that had been under paspalum for fourteen years. The area was divided into eight equal parts, half of which were ploughed and harrowed and half harrowed only with a heavy harrow.

Fertilisers were applied at the following rates per acre:—

Plot 1—Unmanured.

Plot 2—Carbonate of lime, 15 cwt.

Plot 3—Burnt lime, 10 cwt.

Plot 4—Nauru phosphate, 1 cwt.

Plot 5—Unmanured.

Plot 6—Nauru phosphate and superphosphate, $1\frac{1}{2}$ cwt.

Plot 7—Nauru, 1 cwt.; sulphate of potash, $\frac{1}{2}$ cwt.; nitrate of soda, $\frac{1}{2}$ cwt.

Plot 8—Basic superphosphate, $1\frac{1}{2}$ cwt.

There were thus eight plots on the area ploughed and eight plots on the area harrowed, allowing a comparison of the use of the same fertilisers on both ploughed and harrowed land.

The ploughing and harrowing of this area was done after the first heavy storm of the wet season in December, and the fertilisers applied immediately after and harrowed in. The first cut was made on 14th February and the second on 14th June, as little or no rain fell during April and May.

The weights of green grass cut from 1 square yard on each plot are:—

Ploughed Area.

Plot.				14th February.		14th June.
1	..	..	..	12 oz.	..	10 oz.
2	..	..	..	6 oz.	..	14 oz.
3	..	..	..	nil	..	19 oz.
4	..	..	..	nil	..	15 oz.
5	..	..	..	nil	..	32 oz.
6	..	..	..	nil	..	$25\frac{1}{2}$ oz.
7	..	..	..	nil	..	24 oz.
8	..	..	..	nil	..	17 oz.

Harrowed Area.

Plot.				14th February.		14th June.
1	..	..	..	5 oz.	..	4 oz.
2	..	..	..	52 oz.	..	12 oz.
3	..	..	..	48 oz.	..	12 oz.
4	..	..	..	16 oz.	..	12 oz.
5	..	..	..	35 oz.	..	13 oz.
6	..	..	..	17 oz.	..	10 oz.
7	..	..	..	53 oz.	..	14 oz.
8	..	..	..	29 oz.	..	14 oz.

The ploughing, owing to the matted nature of the roots and the hardness of the soil, was uneven, parts here and there being missed. Where the ground was all turned over most of the grass was killed, which accounts for the yield in Plots 1 and 2 only in the first cutting on 14th February.

So far, no indication is given of any benefit from the application of fertilisers.

On 13th June, the day before the last cutting was made, a thunderstorm giving upwards of an inch of rain fell.

The coming year should provide more useful data, as, owing to the season, no really definite conclusions can be arrived at just now.

PLANT DISEASES.

Maize.

The crops of maize on the Tableland have been subject every year, especially in those in which the rainfall was up to or above the average, to fungus diseases, chiefly species of *Diplodia*, *Mucor*, and *Penicillium*. In dry seasons loss from this cause is very greatly reduced, showing that the usual seasonal conditions adversely

affect the variety now grown, thus evincing the need for the introduction of a disease-resisting variety or varieties, as explained in an article, "Tableland Maize," published during the year.

On the Tableland during the past season the incidence of leaf stripe, *Helminthosporium turcicum*, was greater than in previous seasons, but that of head smut, *Sorosporium Reilianum*, was much less.

Potatoes.

All crops were remarkably free from fungus disease, largely due to the treatment of seed and the spraying of plants given, according to the advice of the Department.

Tomatoes.

While the trouble of the wilt disease, *Fusarium lycopersici*, has been overcome by the general use of the resistant varieties introduced by the Department, there are other diseases to which the tomato plant is subject that have caused some damage.

Towards the close of the picking season in September and October, at Bowen, when the weather was dry and daily temperatures high, practically the whole of the older plants died out or the leaves, except the newest at the tips of the branches, suddenly withered, remaining on the plant for some time in dried-up masses. This is considered to be due to a species of *Phytophthora*, which, unlike its congener *P. infestans*, is active only during the hot weather.

Cucumbers.

The whole of the cucumber crops in the Bowen district after July were attacked with disease, to their total loss. Specimens of fruit showing a peculiar spotted discolouration under the skin which caused it to be designated locally as the measles disease, with specimens of sections of the vines and stems, including the point of emergence from the soil, were submitted to the Vegetable Pathologist, who identified more than one specific fungus. Farmers of long experience at Bowen refer to a similar loss of the crop some twenty years previously.

As specimens, no matter how well packed, when sent through the post, necessarily take some time to reach Head Office, they cannot permit of such a satisfactory microscopical examination as would be possible if carried out on the spot. It is consequently suggested that provision might be made for a visit to the Bowen district by a pathologist should the disease mentioned recur this coming year.

INSECT PESTS.

Nematodes.

Trouble with nematodes is a frequent experience with many crops in the North, being most prevalent on a friable, easily worked soil such as a volcanic or sandy alluvial loam. A trial in control was made in tomato seedbeds at Bowen during the year with paradichlor., chlorocide A, and chlorocide B, with negative results for each. "Vaporite," which has been proved successful in this direction during past years, was unobtainable, but it is hoped that during the coming year further experiments, including this substance with those previously mentioned, will be carried out. Apart from nematodes, damage from other pests was not greater than in average years.

AGRICULTURE IN CENTRAL QUEENSLAND.

By G. B. BROOKS, Instructor in Agriculture.*

Conditions at the commencement of the year were most promising. The widespread rains that fell during June, 1925, approximately 5 inches, were sufficient to saturate and permit the breaking up of the soil for the early planting of summer crops. Very little rain fell in July, but useful showers were experienced throughout the subsequent months—August to December. Cotton and other crops made good headway during the early stages of growth, and in anticipation of the usual summer rains prospects for a heavy return looked very bright indeed. The rainy season unfortunately did not materialise, in consequence of which the maize crops were a comparative failure, while the cotton harvested was only about half the return expected.

*In the Annual Report of the Department of Agriculture and Stock.

In the northern portion of the Central district—extending from St. Lawrence to Bloomsbury—very little rain fell from June to December. Fairly heavy storms were, however, experienced during the latter end of December and of January, while scattered showers fell throughout February and March. From March to June conditions in this section have been very dry, the crops in many places showing the lack of bottom moisture. Fortunately feed for stock is in most places still plentiful.

The southern portion of the district, more particularly the area around Bundaberg, has suffered from the prevailing dry conditions. During the latter end of May a storm swept over this part of the State, the rainfall being exceedingly heavy, the registration in places giving from 14 to 18 inches. Miriam Vale shared to the extent of 5 inches; while Gladstone, being on the fringe of the disturbance, received 2 inches.

Conditions in the Western district are deplorable. Enormous quantities of fodder have been railed daily from the coast for starving stock.

ACTIVITIES.

A very comprehensive scheme of experimental and demonstration plot work was undertaken during the year under review. It is hopeless, however, with only one Field Assistant, to give requisite attention to field work conducted over an area embracing some 400 miles of coast line. Personal visits in connection with the giving of advice to settlers, silage making, fodder conservation, office duties, attention to visitors (many from other States in quest of information), necessarily take up a considerable amount of one's time.

The carrying out of trials with various crops requires the almost continuous attention of Field Assistant Straughan, who takes a very keen interest in this most important work.

The establishment of the power alcohol industry in the Central district necessitated much attention being given to the growing of starch-producing crops suitable for the manufacture of the spirit.

An exhibit of cassava products was prepared and displayed at the Royal National Show in Brisbane.

During the year I attended several agricultural shows in the capacity of judge.

POWER ALCOHOL.

A considerable amount of time has been given to the matter of raising and testing starch-producing crops for the production of power alcohol. So far the following three products have received special attention:—Cassava, arrowroot, and sweet potatoes.

Cassava.

As the result of the arrangements made while in Java, 750,000 feet of cassava sticks arrived in Queensland at intervals extending from July to January. A large portion of this material was secured from the Government Plant Breeding Station, Buitenzorg. Arrangements were made with the Plane Creek Sugar Mill Company to distribute the cuttings amongst their respective cane suppliers. Over 100 acres were planted in the area extending from Flaggy Rock to Baker's Creek.

Although conditions were most adverse when most of the plants were distributed, a satisfactory germination resulted. Subsequent growth was very rapid until April, some varieties attaining a height of 12 feet. Although practically no rain has fallen since, a steady growth was maintained until June, when several frosts were experienced, accompanied by heavy cold winds. The low temperatures—more particularly on the flats—affected the tops of the tender branches on one or two varieties. In Java the variation in temperature is only a matter of 2 to 3 degrees. The cassava plant, until acclimatised to Central Queensland conditions, will undoubtedly be affected by low temperature.

Arrowroot.

A ton of arrowroot bulbs were procured from Redland Bay and planted out in various parts of the Plane Creek district. There was little or no moisture in the soil when put in, and as no rain fell during the subsequent two months a crop failure was anticipated. When rain fell the germination was naturally somewhat patchy. The resultant crops will, however, provide sufficient material to plant out a fairly large area during the coming season.

Sweet Potatoes.

A number of varieties were introduced into the district, with the object of providing cuttings for the carrying out of comparative tests in conjunction with cassava and arrowroot.

Experiment Plots.

Two subsidy plots were arranged for—one on the farm of the Salter Estate at Koumala, the other at Sarina on the farm of P. C. Brooks, representing the southern and northern portion of Plane Creek sugar-growing area. Comparative tests are being carried out on those farms with eleven specially selected cassava varieties procured from the Plant Breeding Station in Java. The varieties embraced in the mixed unnamed commercial types, also obtained, will be segregated and tested in conjunction with the selected material, together with arrowroot and sweet potatoes.

Fodder Crops and their Conservation.

The raising and testing of crops suitable for the feeding of dairy stock and pigs is probably the most important activity associated with the work of the Instructional staff.

Arrangements were made with farmers in the various agricultural sections to co-operate with the Department in the raising of fodder crops in order to demonstrate the most suitable varieties to grow to maintain a continuous supply of succulent material for their cattle and pigs through the year.

In the matter of summer-maturing crops the suitability of sorghum, both as a standover winter feed and summer crop, has been consistently advocated by the field staff for many years.

It has been demonstrated that sorghum, if planted early, will give two cuttings during the season. The first, if desired, may be made into silage, while the second can be allowed to stand over and be used as required during the early part of the winter.

Sudan grass, a fine variety of sorghum, will also provide two cuttings, and has the advantage of being a crop that it is possible to handle with an ordinary binder. The first cutting can, should conditions be moist, be converted into silage, the following one dried and made into hay. Sudan grass has become a most popular fodder. In all probability 95 per cent. of the farmers in the Central division are now growing this useful crop.

The raising of sorghum is also largely on the increase, not only as a green fodder but as a grain-producing crop. Its value in the latter respect has not by any means been fully realised.

A number of farmers who were not engaged in cotton-growing planted their fodder crops early in the season, and were fortunate in securing heavy yields. The majority, however, delayed until January, and as the wet season did not eventuate most of the crops sown were complete failures.

Particulars in regard to trials carried out with sorghum are as follows:—

Grower and District.	Variety Grown.	Yield per Acre.	Planted Date.	Harvested Date.	RAINFALL.	
					During Growth.	Previous Month.
J. Jacobsen, Mount Larcom	Saccaline	Tons. 11.78	24-9-25	5-3-26	12.62	0.25
J. Coase, Mount Larcom ..	Red Kaffir	11	24-9-25	4-3-26	12.62	0.25
J. Coase, Mount Larcom ..	Red Kaffir	Bushels 94 $\frac{3}{8}$	24-9-25	4-3-26	12.62	0.25
E. A. Russell, Thangool ..	D. Cream	49.6..	10-11-25	25-2-26	..	..
A. E. G. Barnard, Deeford	Kaffir .. Feterita ..	23.32	7-11-25	18-2-26	9.28	Nil

Other growers in the Marlborough, Mount Larcom, Dawson Valley, and Rosedale districts also planted, but owing to dry weather the crops made insufficient growth for comparative purposes.

WINTER FODDERS.

The work carried out was on lines similar to those of previous years, being more in the nature of actual demonstration than experimental. The object in view is to show the dairy farmers the most suitable crops to grow in order to provide succulent feed for their stock over an extended period. These demonstrations are having a most beneficial effect. In the various dairying centres wheat, barley, and rape are now being grown for fodder purposes in increasing areas.

The results obtained from the plots established in the respective districts are as follows. In some localities the rainfall was not sufficient to bring the crops to their mature growth, therefore it was considered advisable to graze them off:—

Crops.	H. E. Wolff, Ambrose.	F. Huntley, Mt. Larcom.	J. Hales, Rockdale.	A. Barnard, Deeford.	Average.
	T. cwt. qr.	T. cwt. qr.	T. cwt. qr.	T. cwt. qr.	T. cwt. qr.
Florence wheat	9 16 0	2 0 0	6 6 2	6 14 3	5 14 4
Cape barley	8 16 3	4 0 0	..	7 2 1	6 13 0
Skinless barley	8 10 1	2 0 0	5 3 2	5 10 0	5 5 0
Algerian oats	11 14 3	Nil	Nil	7 1 2	9 8 0
Ruakura oats	12 4 1	Nil	Nil	6 8 2	9 6 1
Wheat and blue field peas	8 4 0	2 0 0	6 1 1	7 3 2	5 17 1
Wheat and dun peas ..	7 14 1	2 0 0	6 1 0	7 3 2	5 14 3
Planted	28 4 25	10 8 25	7 7 25	1 7 25	..
Harvested	17 9 25	0 11 25	2 12 25	14 10 25	..
Rainfall on crop ..	937 points	386 points	..	383 points	..
Previous month ..	Nil	25 points	..	420 points	..

F. Huntley's plot was grazed off, the yields given being only approximate.

Other growers were: F. Ferguson, The Caves; J. Hoare, Alton Downs; A. Adams, Goovigen; A. Rake, Marlborough. Owing to dry weather these plots failed, growing only 6 inches high.

Fertiliser Tests.

These were conducted on the farm of Mr. A. J. Turner, Boyne Valley. The fertiliser and crops used were similar to those of previous years, and were applied to the same portion of land.

The results obtained were unsatisfactory through the cereals running into head during the very early stages of growth and before stooling had taken place, due in all probability to the mild nature of the weather prevailing at the time. The details are as follows:—

Manures, applied in Cwts. per Acre.	YIELDS—TONS PER ACRE.				Totals.
	Wheat.	Rye.	Barley.	Oats.	
2 dried blood	5.7	0.8	5.5	4.65	16.65
1 potash 2 basic super	5.85	0.8	5.85	4.1	16.6
1 dried blood 1 potash 2 basic super	5.45	0.8	5.65	4.35	16.25
$\frac{1}{2}$ dried blood $\frac{1}{2}$ potash 1 basic super	5.75	0.8	5.45	4.00	16.00
1 dried blood 2 basic super ..	5.35	0.8	5.45	4.3	15.9
1 potash	5.45	0.8	5.3	4.05	15.6
3 meatworks manure	5.2	0.8	5.05	14.15	15.2
1 dried blood 1 potash 2 super ..	5.3	0.8	5.25	3.75	15.1
Control—no manure	5.1	0.8	4.7	3.9	14.5
Control—no manure	4.9	0.8	4.8	3.7	14.2
2 basic super	4.5	0.8	4.85	4.05	14.2
2 super	5.1	0.8	4.7	3.55	14.15
Control—no manure	4.65	0.8	4.4	3.45	13.3

Arrangements have been made for the carrying out of a similar fertiliser test on the farm of A. E. G. Barnard, Wowan district.

Mr. Turner's plot will be planted under roots, onions, and soy beans, of the following varieties:—

Roots.—Broad leaf rape, green-top yellow Aberdeen turnip, Grandmaster and champion purple-top swedes, long red and yellow globe mangels.

Onions.—Early golden globe, early Barletta, Silver King, and brown Spanish, and the soy bean varieties Laredo, Biloxi, Tokio, and Mammoth yellow. The fertiliser for this plot has been applied and the seed recently planted.

ROOT CROP DEMONSTRATION PLOTS.

The making provision for a supply of material suitable for pig-raising purposes has by no means become a settled practice. It has been demonstrated that by adopting a system of early and thorough cultivation it is possible to grow heavy crops of roots—such as mangels, turnips, sugar beet, &c.

The results secured from the plots arranged for in the various districts are as follows:—

Crops.	J. A. Ross, Ambrose.	S. Larsen, Miriam Vale.	G. McRae, Biloela.	A. Rake, Marlborough.	Average.
	Tons cwt. qr.	Tons cwt. qr.	Tons cwt. qr.	Tons cwt. qr.	Tons cwt. qr.
Rape	18 7 1	10 16 1	5 1 1	6 0 0	10 1 0
Silver beet ..	15 2 2	Nil	5 12 0	4 0 0	8 5 0
Chow moulrier ..	27 0 0	Nil	4 8 2	3 6 3	11 12 0
Purple-top turnip ..	32 9 0	25 1 0	} Attacked by aphid	} Attacked by aphid	28 15 0
Green-top turnip ..	21 12 3	26 0 0			23 16 2
Khol rabi	15 0 0	Nil	Nil	Nil	15 0 0
Field carrots ..	14 0 3	27 0 0	7 19 0	2 12 0	12 18 0
Sugar beet	30 5 0	16 0 0	Nil	Nil	23 2 2
Cabbage	27 0 0	17 5 3	6 0 0	Nil	16 15 1
Swede turnip ..	25 18 2	37 18 0	Nil	Nil	31 18 1
Long red mangle ..	38 19 2	25 18 2	Nil	18 3 0	20 15 1
Yellow globe mangel	31 6 2	29 3 2	18 3 0	9 1 2	21 18 2
Planted	1-7-25	27-6-25	22-6-25	28-6-25	..
Harvested	30-11-25	21-12-25	19-11-25	25-11-25	..
Rain on crop ..	627 points	Not recorded	559 points	Not recorded	..
Previous month..	473 points	Not recorded	106 points	Not recorded	..

Other growers were: F. Ferguson, The Caves; F. E. Sturm, Mount Larcom; H. Young, Wowan. Owing to the dry weather these plots did not sufficiently mature for the collection of data for comparative purposes. The growers, however, realised the advantages to be gained from growing these crops.

A further series of plots have been arranged for in the following districts:—

Callide Valley, G. F. McRea.

Wowan, J. W. Lindley.

Miriam Vale, S. Larsen.

Ambrose, J. A. A. Ross and G. Heinche.

Mount Larcom, J. C. E. Jacobsen and F. Huntley.

Marlborough, A. Rake.

OTHER CROPS.

Onions.

In the growing of onions the main obstacle to success has invariably been the lack of early preparation of the land. This is essential in order to conserve bottom moisture, and more particularly to get rid of surface weeds.

Four trial plots were arranged for to ascertain the most suitable varieties for Central Queensland. Owing to the dry conditions prevailing only one plot was planted. Germination being irregular reduced the yield per acre very considerably; but in regard to size and quality the crop was, on the whole, satisfactory.

The plot was planted on 14th July, 1925, and harvested 25th January, 1926, although immature. The total rainfall during growth was 321 points, and for the previous month was nil. The plot was on the farm of J. A. Adsett, Jambin. The yields were—

						T. cwt.	qr.	lb.
Early White Barletta	..	..	..	..	..	1	2	2 13
White Spanish	..	..	..	..	..	1	0	2 23
Extra Early Yellow Globe	..	..	..	..	..	1	0	0 26
Mammoth Silver King	..	..	..	..	..	0	19	1 18
Anderson's Selected Long-keeping Brown Spanish	..	..	..	..	..	0	15	1 19

The other growers were—

A. E. G. Barnard, Deeford.
Jones Bros., Tanby.

J. Sinclair, Ambrose.

Soy Beans.

The following varieties were planted out during November in the Dawson Valley, Boyne Valley, and Mount Larcom districts:—Tokio, Laredo, Mammoth Yellow, and Biloxi.

Although a fair amount of moisture was present in the soil when sown, results on the whole were unsatisfactory. The plants made very poor growth, and the pods produced ripened over an extended period, making it impossible to economically harvest the crop. While the bottom portions of the plants were bearing pods, the upper portions were in flower. The pods invariably shed with the sun as soon as mature.

Arrangements were made to try the soy beans as a winter crop in the Mount Larcom, Biloela, and Marlborough districts. The prevailing dry conditions have not so far permitted the planting of the seed.

Experiments of Ex-Season 1924-25.

Owing to the lateness of the season the following records were not completed before the compiling of the annual report for the previous year:—

SORGHUM PROPAGATION AREAS, 1924-25.

Grower and District.	Variety Grown.	Yield per Acre.	Date Planted.	Date Harvested.	RAINFALL.	
					On Crop.	Per mth.
G. Ambrey, Marlborough	Brown Kaoliang	47.7 bus.	10-12-24	20-3-25	} Not recorded	
A. Skewes, Marlborough	Red Kaffir ..	31.24 bus.	8-12-24	20-3-25		
T. Seirup, Gracemere ..	Dwarf Cream Kaffir	10 bus. ..	..-1-25	5-4-25		
Pritchard and Wannop, Archer	White African	..	1-11-24	22-1-25		
A. S. Narracot, Dululu	Feterita ..	35.46 bus.	14-11-24	18-3-25	14.72	1.52
A. McDonald, Ambrose	White Yolo ..	14 bus. ..	21-2-25	13-6-25	17.11	5.84
C. King, Ambrose ..	Feterita ..	20.15 bus.	..-12-24	22-3-25	10.62	3.68
J. C. E. Jacobsen, Mount Larcom	Dwarf Cream Kaffir	73.7 bus.	..-1-25	21-3-25	11.54	4.79
J. Coase, Mount Larcom	Early Amber Cane	..	10-1-25	24-5-25	12.68	4.79

Other crops were planted, but did not mature owing to dry weather.

Maize is not being grown to the same extent as in former years. When the scrub lands in the Dawson Valley and Barmoya were being opened up corn was invariably planted as a first crop, the cleared areas being then grassed with either Rhodes or paspalum. During the past few seasons cotton has taken the place of maize on scrub soils.

Cotton.

The bulk of the cotton crop has been harvested, and although high yields were not obtained this is practically the only product that has withstood the adverse climatic conditions and brought in some return to the farmer.

Potatoes.

The growing of English potatoes is to a large extent confined to localities where irrigation can be carried out. The principal potato areas are to be found along the Boyne River and in the Gracemere district.

Yields of from 4 to 6 tons per acre were generally secured, and the price obtained was in the vicinity of £18 per ton. As two crops are raised during the year, potato-growing under suitable conditions is a remunerative occupation.

Broom Millet.

Broom millet has received a good deal of attention, and it is anticipated that an increased area will be planted during the coming season.

Agricultural Expansion.

The establishment of the power alcohol industry at Plane Creek has now become an established fact.

Efforts are being made to establish a butter factory at Mackay. Extensive areas on the fringe of sugar lands are suitable for dairying. Quite a large number of high-grade stock have recently been introduced into the Mackay district. A good deal of development has taken place in the lands adjoining the railway line in course of construction from Rannes to Monto.

The following facts are of interest in showing the expansion that has taken place in the dairying industry in the Central Division—Port Curtis district—for the last five years:—

	1920.		1924.		Per cent. Increase.
No. of dairies	930	..	1,441	..	56.0
Total dairy cows ..	26,732	..	44,357	..	66.0
Butter made (lb.) ..	1,650,142	..	3,420,353	..	107.3

Five concrete silos have been erected in the Central district during the year.

FORESTRY.

By E. H. F. SWAIN, Chairman of the State Provisional Forestry Board.*

Without forests there scarcely could have been a history at all. The wooden arrow of the invader would not have pierced the eyeball of the Saxon Harold, and the Viking Coracles would not have turned the pages of history upon the seas of England. The timbers of the ship that carried Columbus formed the cradle of the United States of America; and the trees that made the "Endeavour" made the Commonwealth of Australia.

Upon the products of the trees depends very largely indeed the lives you lead, Mr. Swain emphasised. Whether sunk in the wooden armchair of ease or smiting a 300-yard drive over seven bunkers and three water jumps, the result depends upon wood. Your industries, your commerce, your professions, and your amusements subsist upon trees.

To-day the forest has its triumphs in the wooden printed sheets which carry the news of the world, and the thoughts of men, and counter-attacking the rural interests which have decimated it in the past, it invades the commercial sphere with silk and wool manufactured by the direct route from the tree instead of via the silkworm and the sheep.

In the Days of Solomon.

The first really practical forest organisation recorded in history appears to be that of the King Solomon-King Hiram co-partnership in the mountains of Lebanon in Syria, where at an elevation of over 4,000 feet, among a succession of the hardest limestone crests and ridges, bristling with bare rock and crag and divided by grassy ravines, among purple rhododendrons, geraniums, isalets, and buttercups, the goodly cedars of Lebanon grew in scattered groves of gnarled and branch trees, 50 to 80 feet in height, with numerous large horizontal branches, trees which would be despised by our Australian bushmen, yet trees made glorious by the Scriptural poets as the excellent cedar, high and lifted up, its top among the thick boughs, its multiplied boughs, its long branches, and its shadowing shroud.

The Mount Lebanon forest in the time of Solomon and Hiram was a timber reserve. In the year 332 B.C. King Alexander the Great made forest history by declaring it to be the first State forest, and to-day the Mount Lebanon State forest still survives, with a hundred or so cedars yet remaining, where the Maronites and the mysterious Druses now hold sway and do battle against the Frank invader.

*From an address delivered recently at Brisbane.

Queensland Forests.

The Queensland Forest Service conception is as that of Solomon, to "make the cedars to be as sycamores in the vale for abundance." The need for wood is no less now than it has been throughout history. The world at large uses each year about 700 billion superficial feet of wood, of which half is for firewood. The per capita consumption is about 400 superficial feet per annum, of which 200 feet is firewood and 200 feet sawn timber. Of that 200 feet of sawn timber per capita per annum about 100 feet is hardwood and 100 feet is softwood. The Queensland consumption about equals the world's average, and this then is the basis of our calculations of Queensland's yearly need in wood. One hundred feet of sawn softwood and 100 feet of sawn hardwood each year for each unit of the population—this is the ration to be provided to the community by the Queensland Forest Service. The total requirements are easy to calculate, for our population number 800,000, and is multiplying at the rate of $2\frac{1}{2}$ per cent. per annum, so that in sixty years the population of Queensland will be around 3,000,000 souls, and their timber demands will be at that time 300,000,000 superficial feet of sawn softwood and 300,000,000 superficial feet of sawn hardwood each year.

But the position is that the 4,000,000 acres of State forests and timber reserves which we now hold are supplying only 50,000,000 superficial feet of sawn softwood per annum, and in thirty years will be providing only 10,000,000 superficial feet, because they are being cut at a greater rate than they are growing. During the period 1925-1955 we shall be short of normal requirements for our population to the extent of 2,700,000,000 superficial feet of sawn softwood, and this we shall have to import at a cost of about £40,000,000 which will go to America and Scandinavia. This cannot be helped and could only have been avoided if we had started wholesale planting 'way back in 1876. Could we rely upon imports for the future then the idea of reforestation in Queensland might be dismissed, but the situation is that the world at large is nearing a softwood famine, and the responsibility lies upon us of rendering ourselves self-sufficient in the matter of wood.

Planting New Forests.

The job before us is to grow crops of timber which maturing sixty years hence will supply at least 300,000,000 superficial feet of sawn softwood each year. Carrying the calculation further we must determine the rates of wood growth per acre in order to determine the acreage now to be put down. There are now extant in response to the approach of forest shortages a number of private forestry companies operating largely in New Zealand, and these companies have issued prospectuses in which are set forth statistics and figures of forest growth, a study of which proves interesting. One such company undertakes to plant 680 trees per acre, and calculates that 500 will reach maturity in twenty years with a tree content of 500 feet each, that is 250,000 superficial feet per acre of log timber or reduced to sawn timber allowing 25 per cent. waste in sawing, say 187,500 superficial feet of sawn product in twenty years, or 562,500 superficial feet in sixty years. Dividing this acreage result into our prospectus need of 300,000,000 superficial feet we find that 530 such acres would furnish our wants, so that presumably if we lay down 530 acres of plantation each year our provision would be ample. That, indeed, was the acreage of plantation laid down by the Queensland Forest Service last year in this State. We are, however, not satisfied with this accomplishment because we are not as successful in our estimates as private enterprise appears to be. Our calculations suggest that planting 680 trees per acre, as do the private forestation companies, we may expect each acre to put on wood at the rate of 1,000 feet per annum, which is perfectly satisfactory to us. In such case there would be 60,000 superficial feet on each acre at the end of sixty years, and 5,000 such acres would supply our requirements. We believe that 5,000 acres per annum of new plantation is much nearer the mark than the 535-acre proposal of the private prospectuses, and this figure we have accepted as the basis of our planting plans. That makes our 1926 provision perfectly inadequate. Next year, however, we expect to lay down 1,000 acres, and thereafter to increase as fast as possible until we attain the 5,000 acres—our minimum objective.

Applied Silviculture.

Believing, therefore, that it is its special function and responsibility to provide for and to safeguard the community's timber supply, the Queensland Forest Service proposes to proceed with its programme of logging and harvesting and marketing and milling the old wood crops and by applied silviculture to bring the forests of Queensland to such a state that future generations may be assured of a renewal of the forest bounties which the past generations have so carelessly wasted and despoiled.

SHEEP TRANSPORT BY MOTOR.

A remarkable experiment in the transport of sheep has been carried out by Mr. W. A. Russell, M.L.A., of Jimbour House, Dalby.

Mr. Russell purchased 10,000 full-woolled merino wethers from Listowel Downs, Blackall, and shifted them to his Nardoo property in the Cunnamulla district, a distance of 210 miles, by motor lorry. The country over which these sheep had to travel, at the time, was drought-stricken, and it would have been practically impossible to drive the sheep in the usual way. They had to be moved, and quickly, on to good feed, so, in order to do so, Mr. Russell entered into a contract for these sheep to be moved by motor lorry. It was the first time that such an experiment had been attempted with such a large mob of sheep, and considerable risk naturally attached to the venture.

The trailers were built by Mr. J. J. Lucy, of Toowoomba. The dimensions of the bodies were 25 ft. long, 8 ft. wide, and 6 ft. 6 in. high, with four floors, the upper three being movable. The wagon-backs were fitted with double gates, and the sheep were loaded in, one floor complement at a time. The trailers were mounted on two wheels and attached to the lorries on a turntable, so that there were six wheels in all.

When the transport of the sheep began, the first trip proved that the bodies of the lorries were not strong enough to carry the weight, so they were returned to Charleville for alteration. The bodies were strengthened, also the floors of the different compartments, for the sheep had proved to be heavier than expected, averaging 52 lb. in weight. On returning to Listowel, the lorries were loaded again and once more started out, the number of sheep in each lorry being cut down to 250 from 300, the top compartment being left empty. This time more success was met with, and the journey more than half accomplished, when the lorry bogged in a bad crossing of a bore drain, necessitating the unloading of the sheep. These were shepherded and fed on mulga while the vehicle was got clear of the bog.

Another accident occurred, when one of the lorries overturned completely, killing eighty of the sheep. Mr. Russell thereupon altered the design of the lorries, and in place of trailers had the bodies built on to the chassis. From then on there were no more mishaps, the trips were done in good time, and the sheep put on to good feed on their arrival at their destination.

Mr. Russell, in order to hasten the transport, had a third lorry built in Brisbane to his own design, which proved very strong and successful. It was fitted on to a $3\frac{1}{2}$ -ton truck, and carried 5 tons of sheep, the body itself weighing $1\frac{1}{2}$ ton. With the three lorries in use, the transport of the sheep continued. The runs were accomplished in from twelve to fifteen hours, and the sheep landed in good condition. Losses in transport and after arrival were under 3 per cent., and Mr. Russell considers the undertaking a most successful one.

Rain in the Central West prevented the last 3,000 being shifted by motor lorry on account of the state of the roads, and these were sold at a good advance in price, sufficient to pay for the transport costs, which amounted to approximately 3s. 6d. per head.

The experiment was watched with great interest by many graziers, pastoralists, and pastoral companies, and the success of Mr. Russell's venture led to a contract for the removal of 10,000 sheep from Oakwood Station to Boatman Station, Wyandra. It was agreed to move these sheep for 1s. 1d. per 50 miles, one way only to count. The distance was 150 miles. Cancellation of contract meant one-third payment of total cost, if rain fell. Rain did fall, and the company concerned handed in its cheque for the amount agreed upon.

Another contract was accepted for the Portland sheep—6,000 head—but rain also caused the cancellation of this contract.

Mr. Russell considers that the success of his experiment was solely due to the position of the sheep in the lorries. They were packed in a sitting-down position, one close against another, with no room for them to stand, even had they been able to get upon their feet. By this means the sheep were not knocked about at all, and remained in the same position throughout the journey. The shelves on which the sheep were placed were 16 in. apart, which prevented the animals from standing up.



PLATE 131.—SHEEP TRANSPORT IN WESTERN QUEENSLAND.

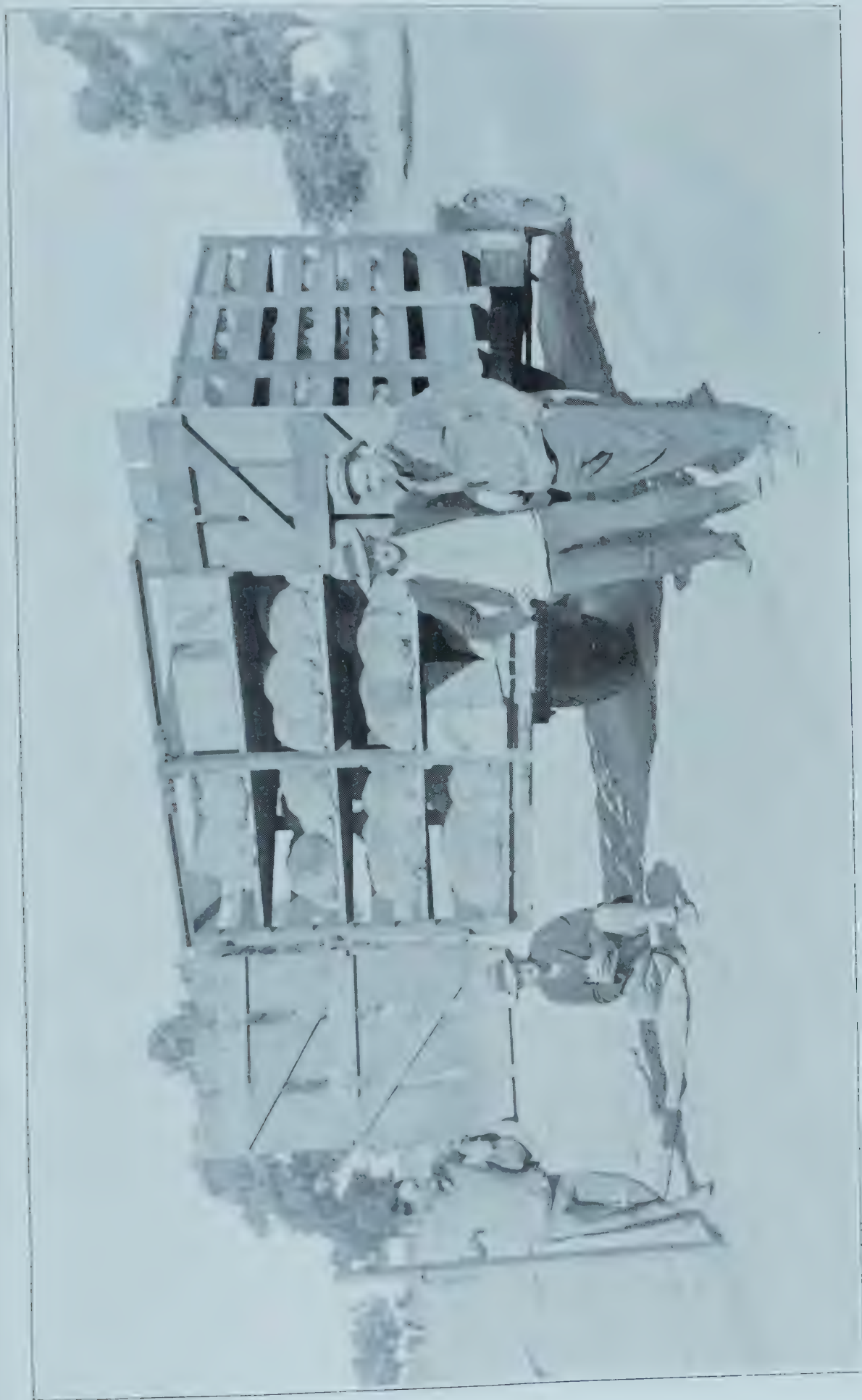


PLATE 132.—TRANSPORTING SHEEP TO RELIEF COUNTRY.—HOW THE ANIMALS WERE PACKED.



PLATE 133.—OFF TO GREEN PASTURES.

Employment of modern means of transport overcomes the problem of dried-out stock routes in Western Queensland.

ALCOHOL FROM SUGAR BEET.

Last January the British Minister of Agriculture appointed a committee to consider technical questions involved in the manufacture of alcohol from sugar beet for power purposes and to report upon (a) the probable cost of production of alcohol from sugar beet; (b) the value of alcohol for power purposes as compared with petrol and benzol and the comparative price at which it could be sold in competition with these fuels; and (c) the prospects of alcohol production by synthetic process. The committee's report has now been published, and the following is a summary of its findings:—

(a)—

- (1) The cost of raw material, referred to a gallon of alcohol, after allowing for the value of residual products, should be taken as 5 per cent. of the price per ton of beet.
- (2) Manufacturing cost, i.e., the total cost of conversion should be put at the rate of 9d. per gallon.

Thus, with sugar beet at £1 and £2 per ton respectively, the cost per gallon of 95 per cent. alcohol net naked at works would be 1s. 9d. and 2s. 9d. respectively.

- (3) In addition, there are costs due to denaturation, packages, transport, and selling charges.
- (b) For use in internal combustion engines of present design, one gallon of 95 per cent. alcohol is equivalent to less than three-quarters of a gallon of petrol. It is possible that if the situation is skilfully handled from the commercial point of view, a market for a moderate quantity of fuel alcohol at approximately the same price as petrol might be secured.
- (c) The present position with regard to the production of alcohol by synthetic processes is obscure, but the effect of the development of such processes would undoubtedly be to exercise a restraining control on the price of petrol and other materials. It should be borne in mind that the production of other fuels, by synthetic or other means, suitable for use in internal combustion engines, will have a similar effect in controlling prices.

Neither for the production of synthetic alcohol nor for substitute hydrocarbon fuels can it be expected that a reliable statement as to costs will be available for a few years.

TON LITTER CONTESTS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The pig farmers of America are proud of the fact that they have on many occasions during recent years beaten all previous records in regard to the weight to which it is possible to successfully raise a litter of pigs in six months from date of birth—in fact, record-breaking litters are almost the order of the day, and it seems that there is apparently no actual limit to the weights being attained. The original purpose of the “ton” litter scheme was to see if it were possible by improved methods of feeding, breeding, and management to successfully raise a litter of pigs to the age of six months and at that age to have them weigh in all 2,000 lb. (called in Australia a “short” ton—2,240 lb. being the “long” ton or the ordinary ton weight). Mr. Shelton’s notes on the subject are of exceptional interest.—Ed.

The contest was inaugurated by Professor James R. Wiley of the Purdue University, U.S.A. Most breeders refused at first to enter any litters in the contest, claiming that it was impossible to produce a single litter of pigs of that weight at six months of age. Data secured soon disproved this, with the result that there has been considerable interest in ton litter contests during the past two years. We have been slow to adopt this scheme in Australia, largely for the reason that most breeders here still seem to think it impossible to produce a ton of pork in six months in the manner indicated. It is hoped the publication of the figures referred to in this article and the illustrations thereto will create added interest and actually result in the scheme being initiated.

The Latest Record.

5,117 lb. on 17 pigs at 180 days old.

FACTS ABOUT THE WORLD’S CHAMPION LITTER.

Pigs in litter (10 boars, 7 sows)—total, 17.

Date of birth of these pigs—30th March, 1926.

Average weight when weaned (8 weeks)—66 lb.

Average daily gain per pig from weaning to final weight—1.89 lb.

Average final weight per pig—301 lb.

Final weight of litter, 27th September, 1926—5,117 lb.

Feed, exclusive of pasture for 100 lb. gain—512 lb.

Cost of 100 lb. gain, exclusive of pasture—6 dollars .07 cents—

Equal to a cost here of £1 5s. 1d. per 100 lb. gain.*

Breed of pigs—Poland-Chinas.

Breeder—W. T. Rawleigh Co., Freeport, Illinois, U.S.A.

Sire of young pigs—“Sun Ray,” a noted sire.

Dam of young pigs—“Miss Clansman Giantess 2nd.”

* Dollar rate calculated on 4.84 dollars to £1 sterling.

In recording the details of this phenomenal performance in the “Poland-China Journal,” Dr. G. H. Conn says “that with the final weighing on 27th September, 1926, of the litter of 17 purebred Poland-Chinas owned by the W. T. Rawleigh Company, and entered in the Illinois ton litter contest, a new world’s record in pork production was established. This litter weighed 5,117 lb. at six months old.

This record, it is stated, does not come as a complete surprise to the swine producers of America, for this breeding herd established a world’s record of 4,789 lb. in 1925 with a litter of 16, and a reserve world’s record of 4,511 lb. with a litter of 15 the same year. In 1924 it established a new State record for Illinois with a litter of 17 that weighed 3,368 lb. This new world’s record litter was weaned when eight weeks old. They then weighed an average of 66 lb., or a total of 1,122 lb. After weaning, the litter was placed on rape pasture; the ration was the grain mixture mentioned herein with buttermilk as a fluid food, with minerals and a home-made pig meal. Shelled corn was fed in a self-feeder. This litter consumed more than 200 gallons of buttermilk each week from weaning time to the conclusion of their record.

Some Facts about the Record.

There were 7 sows and 10 boars in this litter of 17 pigs. The heaviest one of the litter at the conclusion of the test weighed 361 lb. The entire litter averaged 301 lb. each. The litter weighed 2,015 lb. when eighty-eight days old, which was fourteen days earlier than any other litter had ever reached a weight of 1 ton. This litter produced 1 lb. of gain for each 5.12 lb. of feed consumed (less pasture), at a cost of 6 dollars .07 cents per 100 lb., not including cost of pasture. Pigs of this weight were selling on the market when this record was completed at 13 dollars 25 cents per cwt.

How this Litter was Fed.

The feeding of the litter was really begun before they were farrowed; the brood sows at the Rawleigh Ideal Farms are carefully fed that they may produce strong, vigorous young. For a month before their litters are farrowed they do not receive any corn, but the following grain mixture is used:—

	Lb.
Ground hulled oats	150
Wheat middlings	100
Wheat bran	100
Tankage (a grade of meat meal)	25
Oil meal	25

This mixture is made into a heavy slop with skim milk or buttermilk. Some ear corn is allowed to within a month of farrowing time.

When the pigs are four or five weeks old the sow is given some ear corn. The pigs are given some of the grain mixture above in a separate trough, placed in a creep or protected portion of the sty where the sows cannot get to it. They also ate with the sow.

The Advantage of Good Breeding Stock.

The breeders of these pigs are quite convinced that good breeding stock, well fed and cared for, pay handsome dividends. "Sun Ray," the sire of this litter is a large, active boar, weighing 1,000 lb. He was from a litter of 13 pigs that was a consistent winner at many shows in 1924. This litter (of which he was one) was first prize litter at the Illinois State Fair in 1924. A litter mate of "Sun Ray" was junior champion boar at Illinois the same year. "Miss Clansman Giantess 2nd," the dam of this litter, weighs 850 lb., and was bred by the Rawleigh Ideal Farms.

The average litter in the United States (the report continues) contains 5.3 pigs and weighs 1,030 lb. at six months old; the average litter (1926) at Rawleigh Ideal Farms was 9 pigs that weighed 1,800 lb. when six months old.

Other Record Litters.

In the 1925 ton litter contests in the United States there were five litters that weighed more than 4,000 lb. each, and up till 28th September, 1926, three additional litters have reported weights in excess of 4,000, or 2 tons, at six months of age.

The Herdsman.

As in the case of all classes of live stock, the enthusiasm, loyalty, and adaptability of the man on the job counts for much, so it has proved in the case of this world's record Poland-China litter, for this record, as well as the other records at this farm, was due to the untiring efforts of the herdsman, Amory C. Minear, who has been an employee of the Rawleigh Farms for five years.

A Former Pig Club Member.

Mr. Minear is a former pig club member, having been a prize-winning member in 1914. That year he won a trip to the Iowa State College at Ames for having the best pig among the pig club members in Benton County; he earned the money to take the short course in Animal Husbandry at Ames, where he graduated in 1918. Since that time he has been making Poland-China history for the breed. It is significant that this herd, of which he is the overseer, has in its eight years' existence established a number of records. It has held the State record for Illinois ton litters in 1924, 1925, and 1926, the world's record for 1925, and the world's record for 1926.

As far as is known, no other pig raiser in the world has bred and entered four litters in the ton litter contest that averaged 4,653 lb., with three of these litters weighing more than 4,500 lb. each. No other breeder has entered four litters in any ton litter contest averaging 16 pigs each. All of these four litters were sired by the boar "Sun Ray," and two of them were out of one sow.

Development of the Herd.

A few years ago the Poland-China breed was beginning to lose its popularity. Breeders said that they were not prolific enough; their litters were too small, often but four or five pigs. Since the W. T. Rawleigh Company intended establishing their herd to demonstrate practical and profitable pork production, it required skill and judgment in the selection of breeding animals. The founders of this herd selected for their breeding stock animals from large litters and from early maturing strains. With careful selection this herd now has an average of nine pigs per litter (saved) in the spring of 1926, while, as stated, the average for the United States in 1926 was less than six pigs per litter.

In the spring of 1925 eight sows from this herd farrowed an average of 17 pigs each. One sow from this herd farrowed a total of 70 pigs in four consecutive litters within a period of eighteen months. One of these litters was Illinois champion ton litter in 1924. The sow "Orphan Maid" was the dam of the litter of 15 in the 1925 contest that weighed 4,511 lb. and the litter of 16 that weighed 4,198 lb. on 16th September, 1926. She farrowed 47 pigs from 30th March, 1925, to 20th March, 1926.

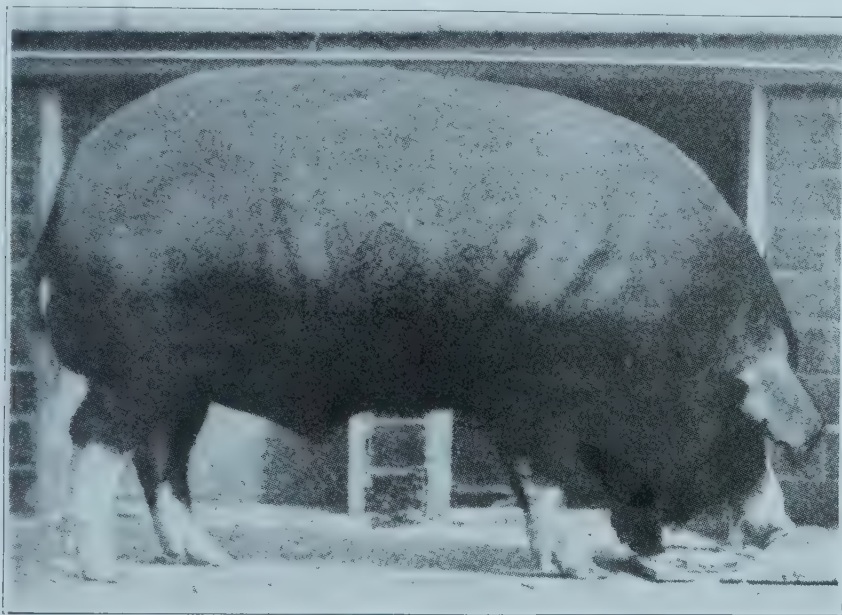


PLATE 134.—SUN RAY, WORLD CHAMPION SIRE.

Champion Litter to be Exhibited.

The W. T. Rawleigh Co. plans to exhibit the world's champion litter at the American Royal Live Stock Show, Kansas City, Mo., and the International Live Stock Exposition, Chicago, Ill. The plan is to exhibit this litter alongside a litter of six pigs weighing 1,050 lb., which is the average litter produced in the United States, and a litter of nine pigs weighing 1,800 lb., which is the average litter produced at Rawleigh Ideal Farms.

Comment.

The fact that these figures have had world-wide publicity through the medium of the "Poland-China Journal" (issue of 10th October, 1926) should be a guarantee as to their accuracy, though the Department of Agriculture and Stock can only vouch for them as they appeared in the journal referred to. Breeders here will probably doubt their accuracy, as up to the present we have no data bearing on the subject here to which reference could be made *re* Australian experience.

Appended are results of other contests as published in American stock journals.

Pig Club Boy Produces Second Top of Pork.

With his latest club experience still fresh in the minds of his neighbours, Oscar Keim, young farmer lad of Somerset county, has just enrolled in the agricultural school of Pennsylvania State college. Just before leaving for Pennsylvania State, Oscar saw his eight purebred Duroc-Jersey pigs tip the scales at 2,161 lb., more than enough to make him for the second time in three years a member of the famous Keystone Ton Litter Club.

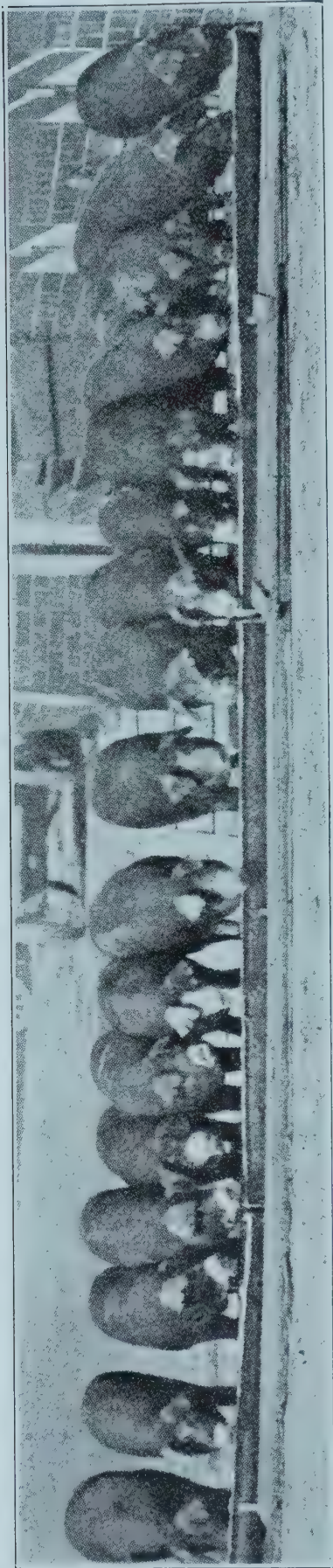


PLATE 135.—SUN RAY'S NEW WORLD'S CHAMPION TON LITTER WEIGHED 2,015 AT 88 DAYS AND 5,117 AT 180 DAYS.

Two years ago he fed nine pigs to weigh just a few pounds over a ton. This year he produced pork at the rate of a pound for every 2 lb. of feed. He used the ration recommended by the State College extension live stock specialists, and his pigs had a self-feeder, water, and pasture. He sold the eight for 13 cents a pound, making a profit of 175 dollars.

Young Keim became a club member in 1921. Since that time he has been in both pig feeding and baby beef clubs. He came into the agricultural limelight two years ago, when his efforts made him the youngest member of the Keystone Ton Litter Club. Last year he was awarded a 100 dollars scholarship by the Baltimore and Ohio railroad for being the best club worker in the seventeen counties traversed by that railway in Pennsylvania. He was also president of his local club in 1925.

Always eager to know and use the best practices in his work, Keim has been a frequent visitor at the office of County Agent C. C. McDowell in Somerset, and he has made several trips to State College to get the very latest information from the live stock specialists. He keenly appreciates the value of proper feeding because his records, always consistently kept, proved it to him.

This record is from the "Duroc Journal-Bulletin," an official organ dedicated to constructive Duroc promotion.

Here are some more records:—

Four Tons in Four Litters—Unusual Pork Production Record is made in Missouri.

Four tons of pork from as many sows in 180 days at a feed cost of 5.46 dollars a cwt. is the record of Ernest Heberling, of Lafayette County, Mo., in a pork-production demonstration conducted this summer in co-operation with the Missouri College of Agriculture. Practical methods of feeding and management were used in the operation. The pigs were farrowed in quarters that had been thoroughly scrubbed with boiling lye water and were kept on ground that was free from worm eggs and filth bacteria. Their ration consisted of corn, tankage, and shorts fed on good pasture.

The four sows, all that farrowed on the farm during February and March, produced two litters of 11 each, one litter of 10, and one of 6, a total of 38 pigs. The two litters of 11 and the litter of 10 were entered in the State ton litter contest. Two of the litters weighed above 2,300 at 180 days old, and the third litter of 11 pigs lacked only 120 lb. of weighing a ton when 164 days old. This they could easily gain in the remaining sixteen days.

At an average age of 179 days the four litters weighed 7,989 lb., or just 11 lb. short of the 4-ton mark when one day younger than the specified age limit.

The feed required in producing the four litters is reported by M. B. Ditty, county agent in Lafayette County, as follows:—Corn, 350 bus., 262.50 dollars; shorts, 2,000 lb., 38.00 dollars; tankage, 1,500 lb., 56.00 dollars; oats, 15 bus., 6.00 dollars; pasture, 25.65 dollars; feed for sows, 48.00 dollars; total feed cost, 436.15 dollars.

The amount of feed required to make 100 lb. of gain was as follows:—Corn, 5.2 bus.; shorts, 25 lb.; tankage, 19 lb.; and oats, 0.2 bus.

Earlier Records—Duroc-Jerseys.

In another report published in the “Duroc Journal-Bulletin” of a year or two ago, one of America’s foremost swine journals, mention is made of a litter of Duroc-Jersey pigs that has broken another record for ton-litter pork production, setting a standard that is likely to stand for some years to come. The twelve pigs included in this litter weighed 3,898½ lb., or an average of 324.9 lb. for each pig at the end of a feeding test of 180 days. This is considered to be a remarkable record for tonnage of pork produced by one sow and for average weight of pig in the period.

The litter was officially weighed on 1st September last, under the supervision of A. L. Ward, swine specialist of the Texas A. and M. College, and officials of the McLennan County Farm Bureau.

The man responsible for this remarkable feat is Vic. Hill, of Chalk Bluff, McLennan County, Texas. Mr. Hill bred the litter and fed the pigs throughout the test. There were fourteen pigs in the litter farrowed on 5th March, 1923. At the end of the contest the pigs were three days less than six calendar months old. One pig was born dead and another was killed, as the sow was unable to suckle more than twelve pigs. The twelve remaining were all raised. When the contest ended the dam was exactly three weeks less than three years old.

Before weaning time the sow and pigs were given a ration consisting of corn, pig chow (a specially prepared pig meal), and skimmed milk. After being weaned, the pigs were started on a ration made up of 60 lb. of skim milk, 24 lb. of corn feed meal, and 6 lb. of pig chow. This was the daily allowance, and was increased as fast as the pigs would take the increase. They were fed twice a day, and given all they could clean up. During the whole period of 180 days the litter were allowed the run of an 18-acre succulent grass pasture, with a freshwaster pond and some shade trees. During the test the litter consumed 16,616 lb. of feed, as follows:—

	Lb.
Corn feed meal	5,420
Skimmed milk .. .	8,896
Pig chow	2,100
Corn	200

in addition to the pasture.

These figures show that it required only 4⅓ lb. of feed for each 1 lb. of gain. This in itself is a fine record. The value of the feed consumed, including pasture, was 229 dollars 84 cents, making the cost of each 100 lb. of gain only 5 dollars 89 cents. Included in the cost of production is a charge for the service fee of the boar. Each pig made an average daily gain of 1⅔ lb. avoirdupois. During the last twenty days the average daily gain was 3½ lb. avoirdupois for each pig.

It is doubtful whether the records made by this litter have ever been equalled for economy of production. When three months old the litter weighed 1,243 lb., at 131 days the weight was 2,325 lb., and at 160 days 3,117 lb.

On the day weighed the pigs were worth 9½ cents per lb. on the market. The cost of production, 229.84 dollars, deducted from the sale value, 370.35 dollars, leaves a net profit of 140.51 dollars. Mr. Hill realised considerably more for the litter, as nine of the pigs were registered as stud pigs, and after being shown were sold for breeding stock.

The litter comes from a long line of ancestors that has earned distinction for its show-ring conformation and quality. The dam was sired by “Ls. Pathfinder,” the grand champion boar of the Texas State Fair, 1919. He was one of the largest boars ever in service in Texas, and was bred and shown by that veteran breeder, George P. Lillard. The litter was sired by a son of “Ls. Demonstrator,” the champion junior yearling boar of Texas in 1920. This boar, also shown by George Lillard, was possessed of tremendous scale and length. His sire was the first prize senior yearling at the Nebraska State Fair some year ago. The unheard-of weight attained by this litter is a distinct triumph for big-type breeding. Pigs with size and length will excel in weight for age, which means profit in pork production.

In order to avoid any possibility of error and to be accurate on every point, the litter was earmarked when seven days old by a representative county agent in the presence of several responsible persons. The scales used to weigh the litter were tested and sealed by the city inspector of weights and measures.

Mr. Hill won 335.00 dollars in cash prizes for producing this world’s record litter; 200.00 dollars of this premium money was offered by the National Duroc-Jersey Records Association, and the remainder by business houses of Texas.

Still another record performance:—

Ton of Pork from Eight Pigs—South Carolina Farmer Makes Good Record on Crossbred Litter.

Eight pigs entered in the State-wide ton litter contest by M. L. Hanes of Davidson County, N.C., on 4th March, 1926, weighed 2,073 lb. on 2nd September, according to C. A. Sheffield, county agent of Davidson County.

“Mr. Hanes has proven himself to be one of our best hog feeders,” says Mr. Sheffield. “The eight pigs which he entered in the ton litter contest were a cross between the Berkshire and Poland-China breeds. They were fed according to methods advocated by the swine extension office at State College and were fed for 180 days. At the end of the period the eight animals weighed 2,073 lb., or an average of 259½ lb. each. They made an average daily gain of 1.44 lb. per day from the time of farrowing until six months of age. Mr. Hanes might have exceeded even this record had he not overfed for one period the amount of shorts called for in his schedule. The amount of fish meal was lower than the schedule called for, but was supplemented with skim-milk.”

Mr. Sheffield states that there were three boars and five sows in the litter. The heaviest pig was a barrow weighing 303 lb., whilst the lightest was a sow weighing 206 lb. Each of the three barrows weighed much more than any one of the five sows. The total cost of the feed given the animals was 119.87 dollars, or a cost of 5.8 cents per lb. to produce the pork. On the day the contest closed Mr. Hanes could have sold his pigs for a little over 300 dollars. Deducting the cost of feed and 48 dollars for eight pigs six weeks old, Mr. Hanes still has left a profit of 132.13 dollars for his labour, in addition to the plant food left on the farm. This plant food is valued at about 30 dollars.

TICK PARALYSIS IN PIGS.

A correspondent informed us recently that he had a well-grown, three-months-old sow that had become suddenly very ill; she went off feed and lay down. On rolling her over, the owner found a whitish coloured tick (known as a dog tick), and he sought information as to suitable treatment for an animal so affected.

Another correspondent advised: “I have recently purchased three first-class Middle York sows, three months old. They were in perfect condition when they arrived here, and have been well fed and cared for since, but two days ago I noticed that two of them were suffering from some ailment or other; they would not come up for their food, were very stiff and “dopey,” and appeared to be getting worse. I am at a loss to know what is wrong or what to do . . .”

The following information was supplied:—The fact that the ailment suddenly manifested itself in the pigs suggests that it may be attributable either to bush-tick poisoning or to severe constipation. The common bush-tick fastens itself on the animal, usually about the head, ears, neck, or under the foreleg, and the poisonous effect of its bite causes a temporary paralysis of the hindquarters (particularly) and frequently severe constipation. These ticks (*Ixode holocylus*) are comparatively common along the coastal districts of New South Wales and Queensland, and one species is found inland. They generally attack dogs, poultry, and pigs; but other animals are not by any means immune, nor even are human beings. After attaching itself to the animal the tick forces its feeding apparatus through the skin (it usually selects a thin-skinned portion of the body for its temporary abode) and commences to suck blood from the affected part. The tick gradually fills up, increases to two or three times its normal size, and at the same time apparently injects a certain amount of poison into the animal, the result being that the animal goes off its food, is disinclined to move from its bed, and when disturbed appears stiff, sickly, and paralysed, particularly in the hindquarters (later the forequarters may also be affected), breathing becomes laboured, and there may be a discharge from the nostrils; bowels are inactive and severe constipation follows; kidneys and bladder become inflamed and congested, and the urine is scanty and high coloured. If not attended to the animal gradually becomes worse, loses condition, and death occasionally results.

Careful search should be made for the ticks, and if found they should be cut off close to the skin with a sharp pair of scissors, or, better still, with a sharp razor. Do not attempt to pull the tick away. After cutting the tick off, rub the affected spot with antiseptic ointment, kerosene, or Stockholm tar.

Remove the pigs to a pen where they can be attended to regularly. Give each pig two tablespoonsful of castor oil in a half-cupful of warm milk as a drench immediately. About three hours after give each pig a mixture of one dessertspoonful of aromatic spirits of ammonia and ten drops of nux vomica (the chemist will make this up for you) in a small cupful of warm milk.

Compel the animals to take exercise; provide dry and warm, clean sleeping quarters, and treat the patients kindly for a few days. Give soft nourishing foods—milk, pollard, a bran mash, and similar foods.

Another remedy that has proved successful is as follows:—Give castor oil or olive oil as already advised, and an hour later give six drops of tincture of aconite each in a small quantity of warm water. Three hours later, if the patients have not recovered, give three drops of the same drug and repeat until four doses have been given; do not give more than four doses. Follow the instructions with regard to feeding and housing.

CONCRETE PIG TROUGH.

Concrete feeding troughs and concrete feeding floors for pigs have many advantages, though at first sight they may appear costly.

The concrete pig trough illustrated herein has recently been constructed at the Warren State Farm, *viâ* Rockhampton, and in forwarding particulars the manager, Mr. W. H. Bechtel, remarks:—

“A type of trough which has recently been constructed at this farm for use in the open for young stock is illustrated in the accompanying photograph.

“It will be noted that it features the combined trough and platform with outside filling, thus making for the ideal under open conditions.

“The trough itself is 14 ft. in length, with a width of 14 in. over all, having its sides of $2\frac{1}{2}$ in. thickness reinforced with barb wire lengthways. It is $3\frac{1}{2}$ in. deep at the top end with 4 in. at the lower end (inside measurement), with a width inside of 10 in., the sides on the outside being 6 in. above the platform.

“The platform is 2 ft. 6 in. in width, with a slight fall from the trough to the outside edge, being of from 3 in. to 4 in. in thickness.

“A protective flange all round of 3 in. by $1\frac{1}{2}$ in. hardwood bolted together at the corners and at the centre makes for greater strength.”

Similar feeding troughs, but on a larger scale, are recommended for farmers having a number of pigs feeding from one trough, for breeders of stud pigs, and for farmers whose principal source of food is buttermilk or whey. Butchers who utilise soup and cooked meat will also find it to their advantage to provide concrete feeding floors and troughs on the lines indicated.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.



PLATE 136.—CONCRETE FEEDING TROUGH FOR PIGS AT THE STATE FARM, WARREN.

A SERVICEABLE BRUSH AND NETTING FENCE FOR PIGS.

The accompanying photograph will serve to illustrate a useful type of shelter and windbreak used in connection with the raising of pigs under paddock conditions at the Warren State Farm, Queensland. In appearance it is neat and attractive, and has proven economical and satisfactory in every way.

It will be noted that old netting is used, thus providing an economic use for this class of material.

The posts are placed 8 to 9 ft. apart, of 6-in. diameter, with holes bored 1 in. from the outside to admit of a top and middle No. 8 plain wire, with barb stapled on at ground line.

The netting is attached to the wires on both sides of the posts; and the space between is firmly filled with bush grass.

When completed, the fence requires no further attention other than an occasional fork of grass as the fence ages and the mass settles down; thus a useful and economical shelter brake is provided.



PLATE 137,—A USEFUL TYPE OF WINDBREAK AND SHELTER FOR DIVISION PIG RUNS AT THE STATE FARM, WARREN.

Fence is constructed with old 36 inch netting attached to 6 inch diameter posts placed 9 feet apart, top and middle wires 8, and barb at ground level; holes bored 1 inch from outsides of posts, thus making two rows of three wires. Bush hay is packed between the wires forming a dense firm fence.

“K” netting fences are both economical and serviceable, withal not unduly costly, but the brush and netting fence herein described certainly has many advantages. Pigs are not keen on forcing their way through a fence through which they cannot see; herein lies the special advantage of picket and paling fences; but if there is a crop of potatoes on the other side of the fence and but a “K” wire fence separating him from the “spuds” the pig will probably find his way through without much difficulty, “K” wire or no “K” wire. The netting and brush fence may be useful in this regard also.

It is at any rate a serviceable type of fence, and as suggested provides the means whereby netting—which might otherwise be discarded—can be put to economic use, even if only on the outside of the fence.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

PIG CRATES—CONVENIENT, ATTRACTIVE, AND SERVICEABLE.

The transport of stud pigs by horse-drawn or motor vehicle or by rail or steamer requires that they be comfortably accommodated in roomy crates, provided with ready means of entrance and exit and with a convenient food trough. The accompanying illustration serves to convey to the reader the care exercised and the provision made by Queensland State Farms and other Government institutions in the crating of stud pigs for transport purposes to all parts of the State. The illustrations are from Warren State Farm, where the manager (Mr. W. H. Bechtel) takes a special pride in providing for the comfort and speedy transport of stud stock *en route* to purchasers wherever they may be situated.

The excellent condition on arrival that is frequently specially mentioned by purchasers of stock from these farms, and the absence of any loss in transit is a testimony in itself to the methods adopted. It will be noted that large airy crates are built, fitted with sliding entrance door and roomy feed trough; the crate is covered with sound bagging protection for tropical conditions—a special feature where stock have often to remain in the open at wayside stations or be conveyed to the farm some miles distant.

It will also be noted that the crates are suitably stencilled with the particulars of the stock and the breeder's name and address, thus presenting a neat and attractive consignment which in itself cannot fail to attract attention.



PLATE 138.—A STACK OF PIG CRATES READY FOR DESPATCH AT THE STATE FARM, WARREN, Q.

Attention to all matters of detail counts much for success in matters associated with the breeding and sale of stud stock. The successful men are the ones to whom all this detail is a pleasure as well as a business. Nothing pleases a buyer more than to have his purchases arrive in an attractive condition, for the arrival of fresh stud stock invariably creates considerable interest among the farming community. The farmer who receives a stud boar or sow in good order and condition in a neat, attractive, stencilled crate, and who can take the pig's pedigree from his pocket-book and exhibit it for the benefit of his neighbours, is certainly doing not only himself but his district a good turn, for much depends upon the success of such purchases. If they are a success good business results; if they are a failure the stud pig business receives a rather hard bump.

It is up to breeders, therefore, to see to it that their stud stock go out to buyers in convenient, roomy utility crates—crates that can be made use of for other purposes than for the mere transport of pigs from station to station or from farm to farm.

Full details as to the size of crates, their approximate cost, &c., can be supplied on application to the Department of Agriculture and Stock, Brisbane, or the manager of the State Farm at Warren, *via* Rockhampton, or Kairi, on the Atherton Tableland.
—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

THE MOTOR-CAR AS A PEST DISTRIBUTOR.

According to Dr. A. H. Clark, of the Smithsonian Institution, there are more than 600,000 different kinds of insects known and at least 3,000,000 more varieties unknown.

Insects make use of the motor-car as a means of annihilating distance, he points out. Just to the extent that insects are taking advantage of modern ways of transportation there is a corresponding danger to farm crops and ultimately the food supply of the country, he declares. The one-crop farmer, too, is ranked along with the motor-car as an agent in assisting in the spread and multiplication of insects—that is, insects find an unlimited supply of the right kind of food on a given acreage, and they thrive in an insect paradise.

“We live in a world replete with other forms of life competing with us for our food supply, and even striving to consume the very substance of our bodies,” stated Dr. Clark, warning of the impending struggle between mankind and his natural foes. He further declared—

“Our chief competitors are the insects of which more than 600,000 kinds are known, and vastly more remain to be made known. In growing the crop and stock by which we live our farmers spend their lives in constant costly warfare with the insects. The number of people who could be fed by the wheat or maize or other grain destroyed by insects or clothed by the cotton or wool lost every year through insect depredations is a vast one.

“The vast improvement in the means of transportation, especially by automobiles, has in recent years greatly increased our danger from the insects through providing them with an easy means of travelling from one place to another quite unnoticed, hidden in produce or in merchandise. Besides this, the common practice of planting large areas with a single kind of crop year after year greatly assists the insects in their efforts to destroy it. They now find an immense supply of just the right kind of food provided for them, and are enabled to increase accordingly. By far the worst enemies of any insect are other insects of predaceous or parasitic types.

“To indicate the extreme complexity of the insects’ war upon each other, Dr. Clark points out that the parasites that destroy a certain caterpillar are themselves preyed upon within the bodies of the caterpillars by other parasites which by destroying them serve to protect and to perpetuate the harmful sorts.

“A study of entomology is a vast web of interwoven facts full of incongruities and apparent contradiction almost too vast for human comprehension,” states Dr. Clark. To illustrate this he cites the case of the cabbage butterflies, which as caterpillars feed wholly upon large and ferocious ants. Ants are perhaps the most inveterate destroyers of the eggs and very young of nearly all the butterflies, yet no ant will ever hurt the eggs of any of the kinds of butterflies that feed on them.

FIELD PEAS AND COW PEAS AS PIG FOOD.

Illustration (Fig. No. 1) is of a heavy crop of cowpeas and Fig. 2 of a handy method of conveying the vine hay to the pig runs for feed purposes. Both field peas and cowpeas provide a useful class of food for pigs of all ages, the field pea for preference where both pods and vines are to be used, and the cowpea for grain, as pigs are not as partial to cowpea hay as they are to that resulting from field peas.

The illustrations are from Warren State Farm, the manager (Mr. W. H. Bechtel) remarking that these crops have provided excellent grazing and also, where grown in distant paddocks, supply an excellent hay and grain food for the pigs.

The method of utilising the vines as illustrated in fig. 2 appeals to one, as it illustrates a very convenient method of conveying the vine hay to the pigs in their runs, the slide providing for convenient loading and also permitting of the pigs doing their own unloading, the slide being left in the paddock till next day, when it will be found to be ready for a refill. By using several of these slides where a number of stock in different paddocks are kept, rapid feeding is carried out and the labour in handling same considerably lightened.

It is labour-saving appliances of this description that enable one man to handle a very much larger number of pigs than would be possible under other circumstances, and incidentally the stock are all the better for having to work for their living in doing part of the harvesting.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.



PLATE 139 (Fig. 1).—A HEAVY CROP OF COW PEAS AT THE STATE FARM, WARREN, QUEENSLAND.



PLATE 140 (FIG. 2).—HANDY METHOD OF FEEDING OUT COW PEAS TO THE PIGS.

AGRICULTURAL ORGANISATION.

NEW MEASURE PROCLAIMED.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) stated recently that the Governor in Council had approved of the Proclamation fixing the 1st December, 1926, as the day on which the Primary Producers' Organisation and Marketing Act, which was passed in the late session of Parliament, should come into operation. As an outcome of this, the Primary Producers' Organisation Acts are automatically repealed, and further consequences arising out of the repeal of those Acts are—

The Council of Agriculture and District Councils constituted under the old Acts are dissolved; all the assets and liabilities of the old Council and District Councils are transferred to the new Council of Agriculture constituted under the Primary Producers' Organisation and Marketing Act of 1926.

In order to provide the necessary machinery for the transfer, regulations have been issued, and these provide—

The final meeting of all District Councils and of the Atherton Tableland Agricultural Advisory Board should be held not later than the 30th November, 1926.

Each District Council of Agriculture and the Atherton Tableland Agricultural Advisory Board must prepare a statement of its income and expenditure up to the 30th November, 1926, and lodge same with the Council of Agriculture, Brisbane, not later than the 31st December, 1926, together with any money that they may have to their credit. The District Councils shall not disburse any money in their possession on the 30th November 1926, after that date.

The accounts of the District Councils shall all be audited by the Auditor-General.

In order to permit of the winding-up of the affairs of the different bodies, the secretary of each of them shall be retained as an officer of the Council of Agriculture until the 31st December, 1926. Books and correspondence belonging to the dissolved District Councils shall be handed over to the Council of Agriculture. All the money handed over by the District Councils shall be placed to the credit of the Queensland Producers' Fund.

The new Council of Agriculture shall consist of thirteen members, and on the 11th December, 1926, there shall be convened meetings of the following commodity boards:—Wheat Board, Queensland Cane Growers' Council, Committee of Direction, Cheese Board, Butter Board, Egg Board, Cotton Board, Peanut Board, Canary Seed Board, Atherton Tableland Maize Board, Northern Pig Board, Arrowroot Board, and the Broom Millet Board. At each of these meetings in question, elected representatives of the primary producers only shall be eligible for nomination and to vote on the election of a representative to the Council of Agriculture when a new commodity board is elected. The persons elected by the commodity boards to sit on the Council of Agriculture shall hold office for the period of the tenure of the office of the commodity board which elected them. The representative of that board to the Council of Agriculture shall be considered as having vacated his office, and it shall be the duty of the newly elected board to at once elect a representative to the Council of Agriculture. The retiring member shall be eligible for re-election.

The first meeting of the Council of Agriculture shall be held at the chambers of the Council of Agriculture, Brisbane, on Wednesday morning, the 15th December, 1926.

The existing levy regulations under the Primary Producers' Organisation Acts shall remain in force until the 31st December, 1926, even if the moneys in respect of the primary produce so sold or supplied are not available on the 31st December. Levies due for the period ended the 31st December, 1926, shall be collected by means of stamps, which have to be purchased not later than the 15th January, 1927. Every person authorised to sell levy stamps or collect levies must, not later than the 31st January, 1927, lodge with the Council a full statement of stamp transactions, together with money due thereon and unsold stamps on hand. The accounts shall be examined by the Auditor-General, and the unsold stamps shall be disposed of as directed by the Auditor-General.

The particular levies made for the purpose of the sugar industry shall remain in force until the 31st December, 1926.

Time is given to the 28th February, 1927, to permit of the winding-up of the affairs of the Queensland Producers' Association Fund, established under the old Acts. Provision is made for the establishment of a new Queensland Producers' Association Fund under the new Act.

Answers to Correspondents.

Fertilising of Pineapples.

C.E.W. (Wamuran)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises that the application of $6\frac{1}{2}$ cwt. of fertiliser mixture should be a liberal supply for a year, which, of course, depends entirely on the growth the pines make. In favourable seasons and good cultivation, a yearly application of about 6 cwt. per acre should be found profitable.

Sulphate of potash and meatworks fertiliser can be kept mixed for years, and actually improves on keeping, and keep just as well as unmixed, as long as they are kept dry under shelter.

Sugar Banana Stalks—Their Stock Food Value.

R.L. (Gympie)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises that banana stalks, chopped up, are a very valuable feed for dairy stock. Molasses may be sprinkled on the "chop chop" before feeding. Some concentrates like bran, cotton-seed meal, &c., may also be added to make food more nutritious.

BOTANY.

African Box Thorn.

"INQUIRER" (Coomera)—

The African Box Thorn is a shrub of 6 to 8 feet, of rather irregular growth; the leaves are somewhat fleshy, small, and light green. The flowers are small bell-shaped, white, with a few lavender streaks or dots. The fruits are bright scarlet berries about the size of a large pea. The plant is very abundant as a naturalised weed around some inland and Darling Downs towns such as Warwick, Roma, &c., but is rarely seen on the coast. So far as Mr. White knows, the plant is not growing in the Coomera district, but there may be a stray plant or two in old gardens. It was introduced originally as a hedge plant.

Plants Identified.

J.L.T. (Atherton)—

The tree with large leaves and yellow flowers is *Diplanthera tetraphylla*, a native of North Queensland and the open forest country of Papua. It is fairly common, but Mr. White has never heard a local name applied to it. The shrub with small, narrow leaves is *Siebera valida*, of the family *Umbelliferae*. We have not heard a common name applied to it. Another species of *Siebera* is common on Fraser Island, where it is known as Carrot Bush. Horses are said to be very fond of it. Other specimens were very fragmentary. As far as the material allows, determinations are as follows:—

A. *Evodia accedens*? Mr. White thinks that this is one of the trees recorded in the "Queensland Flora" as *E. accedens*, but it is thought that several species have previously been included under this name. All our material was sent to Kew for revision recently.

B. *Ficus Watkinsiana*? Would like to see a twig with ripe fruits attached to verify. The fruit you send is immature.

C. Could you not send leaves and a few more fruits?

D. *Acacia Baileyana*. The cause of non-flowering is climatic. The tree flowers splendidly on the Downs, and is a wonderful sight in flower, but about Brisbane and on the coast generally the flowers fall off in bud. The species does best in a fairly cold, dry climate. For purposes of determination, it is much more necessary to have good material of Northern trees than of Southern, as the latter are so much better known.

Cassia ("Yellow Pea.")

"INQUIRER" (Brisbane)—

The specimen forwarded from Roma is *Cassia neurophylla*, a shrub very common this time of the year in parts of the Maranoa and Warrego districts. It also occurs in Western New South Wales, and a form slightly different is found in parts of Western Australia. The only popular name we have ever heard applied to it is "Yellow Pea," a name given to several similar plants in Australia. It is, practically speaking, never touched by stock, and its properties are not known. It belongs to the same genus as the "Sennas" (senna-leaves), and from this and from feeding tests with allied plants one would suppose it to act as a purgative if eaten by stock.

“Russian Knap Weed,” or “Hard Heads.”

A.B.C. (Clifton)—

The specimen proved to be *Centaurea picris*, the “Russian Knap Weed” or “Hard Heads.” This plant has for some years past been naturalised as a weed in New South Wales and Victoria, and now and again appears on the Darling Downs, probably being brought in by imported fodder. It has proved to be difficult of eradication in cultivation paddocks. It is not known to possess any particular properties harmful or otherwise.

“Quinine” or “Native Cinchona.”

C.O. (Yarraman Creek)—

The specimen is the so-called “Quinine” or “Native Cinchona.” It suckers very freely from the base, and on this account is regarded as a weed in some places. The bark is a valuable tonic and is official in the British Pharmacopoea, but the price is very low and the demand limited. A decoction is used sometimes as a tick wash. Further particulars about the tree will be found in the reprint from this Journal which has been forwarded.

THE EXPORT BUTTER MARKET.

In their thirty-second annual review of the imported dairy produce trade Messrs. W. Weddel and Co., Limited, in reporting upon the year ended 30th June, 1926, state that, although the average prices of the various descriptions of butter were mostly lower than in 1924-25, they were still 60 per cent. above the pre-war level. As regards cheese, it is estimated that nearly 30,000 tons, or 45 per cent. of the season's make of New Zealand cheese, was sold forward at prices which averaged the equivalent of 100s. c.i.f., whereas the market value of the goods after arrival, except in the first few weeks, was well under 100s. c.i.f.

The total importations of butter into the United Kingdom were less than the record figures of the previous year, owing to a reduction in the Australian and New Zealand outputs. Denmark and Argentina sent slightly more. Russia sent 14,148 tons, or 4,000 tons less, due to diversion to temporarily high European markets. The total Empire arrivals were 99,884 tons, total foreign 157,077 tons, grand total 256,961 tons, as against 277,898 tons in 1925.

Cheese.—Canada, with 61,863 tons, showed 5,000 increase, as against the 5,000 decrease for New Zealand, which sent 66,953 tons. Total British cheese consignments were 131,691 tons, foreign 19,829 tons, grand total 151,520 tons, as against 149,362 tons in 1925.

The following table of annual average prices for butter, which appears in Messrs. Weddel's review, are instructive:—

AVERAGE WHOLESALE LONDON TOP PRICES OF CHOICEST SALT BUTTER, PER CWT.

For Year ending 30th June.	1917.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Danish	207 8	.. ..	.. ..	.. ..	290 5	214 3	201 10	198 11	214 5	197 10
New Zealand ..	200 4	252 0	248 5	271 11	289 5	190 4	191 10	186 0	189 7	187 8
Australia	197 10	.. ..	.. ..	.. ..	285 8	175 9	184 11	177 3	180 8	182 2
Argentine (unsalted)	.. ..	.. ..	.. ..	.. ..	.. ..	169 3	181 1	166 10	182 0	170 2
Russian .. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	165 8

Speaking of Argentine butter production, Messrs. Weddel says: “Although last year's shipments were heavier than in the preceding year, the actual production of butter in the Argentine Republic showed a distinct shrinkage, which is very difficult to account for, in view of the fact that climatic conditions during the whole year were entirely favourable for production. It is estimated that the local consumption of butter last year was reduced by about 30 per cent., partly due to the increased use of edible oils, the importation of which was encouraged by legislation. Another factor which may have had some bearing upon the reduced production of butter is the higher prices ruling for beef cattle during the past year or so. While cattle prices were low a large number of people turned over from beef fattening to dairy farming; but now that cattle-raising has again become profitable, no doubt many of the farmers have abandoned their attempts at dairy farming in order to resume the business they understand so well.”

HANDLING AND MARKETING OF EGGS.

By P. RUMBALL, Poultry Instructor.

Improvement in the laying characteristics of poultry, correct methods of feeding, and general efficient management are features necessary for the profitable production of eggs, and they are features to which a great number of producers give attention. However, if poultry raisers do not follow up economic production with economic marketing, their efforts are to a large extent wasted. The perishable nature of eggs demands attention by both producer and merchant. This attention is frequently not shown by either party, and this negligence is definitely responsible for the wide range of prices between eggs of similar size. It is also one of the principal reasons for the establishment of extensive co-operative agencies for the sale of eggs not only in Australia, but throughout the world. In order to market eggs in the best of condition, individual as well as collective effort is required—individual effort in the direction of producing an article desired by the buying public, and collective effort in the direction of shipment, storage, and general marketing. In the following pages Mr. Rumball has elaborated these points very interestingly and informatively, and his useful contribution will be welcomed by our poultry-raising readers.—Ed.

The greatest enemy of the poultry industry is the rotten egg. It has been with the industry since fowls were domesticated, and will remain to a limited degree always, but a great improvement is possible. Many producers recognise the importance of quality, but there is a large body of producers who, if they think of the subject at all, give it little or no attention. The importance of quality should be effectively and forcefully illustrated by the disparity in the returns received by various growers. When first quality eggs are realising 3s. per dozen, it is possible to obtain inferior eggs of the same size for 2s. or under, and again in the warmer months when prices are not so high, there is a range of 10d. to 1s. 6d. for eggs of the same size. These eggs when laid had the same quality, but by errors or mismanagement on the part of the producer or country storekeeper or merchant were reduced to two-thirds of their original value, and in some cases even less.

Egg Standards.

In fixing any standard in respect to the size and quality of egg content, the consumer must play an important part, and producers should strive to fulfil his requirements. We have definite knowledge that overseas markets require an egg of about 2 oz., the minimum weight being shipped from Queensland at present being $1\frac{1}{2}$ oz.; but are eggs of this weight packed for local sales? Some poultry raisers do grade their eggs with this minimum, but others again put in as many small eggs as possible in their first pack. No definite buying or selling grades exist for Queensland at present, but, as the development of the poultry industry is dependent upon overseas markets, by reason of the fact that this is the only avenue available for the lifting of our surpluses, the minimum weights of eggs being exported could be taken as a standard for our first local grade. The following grades are therefore suggested as a guide to producers:—

First grade—Eggs $1\frac{7}{8}$ oz. and over; clean, sound, free from blood clots, rings, rots, &c., and air space no larger than $\frac{3}{16}$ of an inch.

Second grade—Eggs $1\frac{5}{8}$ to $1\frac{7}{8}$ oz.; content same as above.

Pullet eggs—All under $1\frac{5}{8}$ oz.; content same as above.

Third grade—Any stale egg—that is, eggs having an enlarged air space, but free from germ development, rots, &c.

It will be seen that the breeder has two particular features to continually bear in mind—namely, size and quality of egg content.

Size of Egg.—The size of egg is chiefly controlled by selection of the breeding stock. Pullets at the beginning of their laying period produce small eggs, but as the birds age the egg improves in size. Size of egg being an inherited feature, the breeder should only use eggs for incubation purposes which conform to the standard of the first grade, and only use cockerels that are the progeny of parents (particularly the dam) which come from layers of large eggs. In fact, in selection for size of egg it would be better to select future breeding stock for this quality during



PLATE 141 (Fig. 1).—A NEW LAID EGG.

This should be nearly transparent only showing a slight cloudiness, the outline of the yolk, and a very minute air cell.



PLATE 142 (Fig 2).—A STALE EGG.

Here the large air cell is noticed, as is also the cloudiness caused by the yolk.

their pullet year, and enhance the possibility of having stock that will lay a standard size egg early in their pullet life, and so bring the production of small eggs down to a minimum.

Colour and Quality of Eggshell.—Colour of shell is of little account in Queensland. Some countries are credited with likes and dislikes, but, as the great majority of our produce has to be sold on the local market, no consideration need be given the feature of colour. We are, however, concerned with the cleanliness and quality of eggshell.

Dirty Eggs.—There are three principal causes for these—(1) adherence of excreta and dirt from the feet of the birds; (2) stains from damp straw or grass in the nests; and (3) eggs which become smeared with the egg content from eggs broken in transit.

Eggs to which excreta adheres or which are soiled by the feet of the birds on a well-conducted farm are not serious, and if cleaned daily after collecting very little damage to the egg content is caused. In the cleaning process, however, do not soak the eggs in water. The washing of the egg not only removes the natural glossy appearance, but opens up the pores of the shell, making entrance for bacteria easy. Gently wipe them with a clean cloth, and if numerous market them as washed eggs.

The farmer is to blame for eggs which become stained from damp nesting or packing material, and for reasons that will be given later should carefully guard against this condition.

Thin-shelled eggs are liable to crack in handling or become broken in transit, with the result that the egg content soils the adjoining eggs and fillers and so detracts from their appearance and causes the growth of bacteria, &c., when they are retained in the egg case for any time. Overfat hens and the lack of eggshell forming material in the form of shell grit are the two principal causes of thin-shelled eggs, and the remedy is evident. There are, however, birds which consistently lay thin-shelled eggs, and when it is possible to trace them they should be disposed of. The shape of the egg is not of major importance, but a uniform product is desirable, consequently uniform shaped eggs should be used for incubation.

Quality of Egg Content.—Freshness is a desirable quality. It is generally conceded that eggs which are perfectly fresh and the produce of well-fed hens are of the finest flavour. The age of an egg, however, is only one factor that affects quality. Under proper methods of cold storage eggs can be kept for many months, and it would be impossible for the consumer to distinguish them from new-laid eggs by taste. The objectionable changes in quality that do take place are principally the partial development of the embryo, its death and ultimate decay, to rot caused by development of bacteria or mould in the albumen, absorption of odours, blood clots, and evaporation of egg content, &c.

In order to determine the internal quality of the egg, the process of candling is necessary. This is a simple process and one that could be practised by the average farmer with advantage to himself and the industry in general. The process of candling is a simple one, the operator becoming more efficient with practice. All eggs exported overseas are subjected to the process, and it is due to these conditions that Queensland eggs in England are being viewed with favour and are commanding a price equal to the Danish egg.

Candling may be done during the day, using the sun as a light, or at night with the aid of a kerosene lamp. The majority of farmers would find it most convenient, however, to do the work during the evening. Many devices may be made to facilitate the work, such as the cutting out of the top and bottom of a kerosene tin, making a hole in its side about the size and shape of an egg, placing it over a lamp so that the hole is on about the same level as the flame of the lamp. A more simple method is to have a piece of cardboard about 6 in. square with an egg-shaped hole in the middle, and a lamp. This cardboard is then held between the egg and the lamp, the egg touching all round the hole in the cardboard. The light will then show the transparency or otherwise of the egg and the size of the air cell.

Fig. 1 shows a new-laid egg. This is practically transparent, the yolk being hardly visible and the air cell practically imperceptible. As the egg increases in age, the air cell becomes enlarged and the yolk very pronounced.

Fig. 2 illustrates a stale egg; the size of the air cell and the cloudy yolk are very pronounced. The yolk of this egg when it is broken for frying or poaching is very flat, while that of the egg illustrated in fig. 1 stands up well.

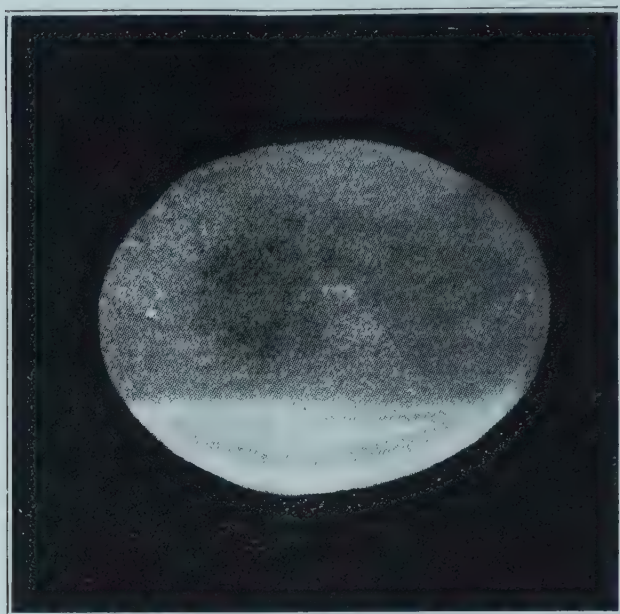


PLATE 143 (Fig. 3).—A ROTTEN EGG.

Caused probably by the partial development of the embryo, its death and ultimate decay.



PLATE 144 (Fig. 4).—A TYPICAL CASE OF ROT CAUSED BY THE GROWTH OF A MOULD.

Stained eggs, where the stain has been caused through damp nests, packing material, &c., even if unfertile, are frequently found to be in this condition.

Fig. 3 illustrates an extremely bad egg, but one which unfortunately frequently finds its way to market. In this egg the air cell has broken, and the content readily flows from one end to the other.

Fig. 4 is a typical case of rot caused through the growth of bacteria or mould in the white of the egg. Dirty nests and poultry houses and damp packing material are largely responsible.

Packing and Storing.

Although producers give every attention to the production of good eggs, their efforts can largely be undermined by improper packing for market and storage on the farm.

Packing.—This needs to be of the most simple kind, and this is supplied when strawboard fillers and cases are used as illustrated in fig. 5. This case, it will be noted, is partitioned into two sections, there being five layers of fillers, each containing six dozen eggs or three dozen each side of the partition. On the bottom of the case a cushion of wood wool is placed, similar to that shown lying on the lid, and

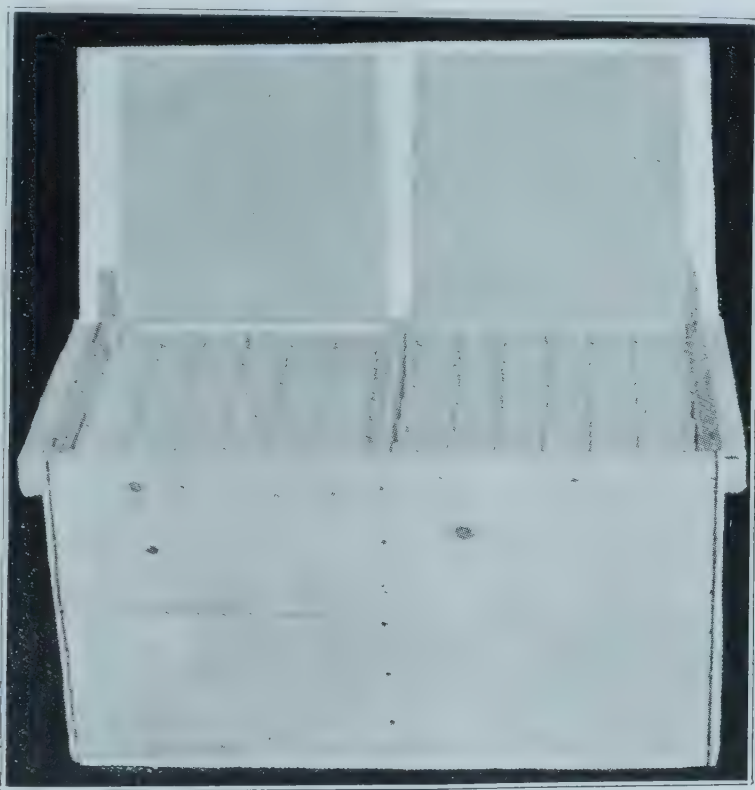


PLATE 145 (Fig. 5).—AN ILLUSTRATION OF A 30-DOZEN EGG CASE.

another pad is placed in the middle of the case. This packing makes the cases firm and prevents to a large extent severe jars, but at the same time additional safeguard is provided by the placing at each end of the case a cleat of wood to facilitate handling. Even although the case is specially built for the transport of eggs, the ends have been bound by a narrow strip of hoop iron as a protection against the timber splitting and the natural consequence.

In Queensland kerosene and petrol cases are largely used on account of the ease with which they may be obtained. Kerosene cases should be avoided on account of odour of kerosene hanging to the case and the ease with which eggs acquire foreign odours. Petrol cases, however, are excellent for the purpose of packing eggs, being free from objectionable odours and much stronger than the kerosene case. These cases should have a small cleat nailed at each end to facilitate handling and to guard against breakages.

Storing.—Eggs have to be held for several days on the farm, and they should be kept in a cool place, free from an excessive air circulation, but the air supply should be at the same time sweet and pure. They should not be stored with any provender having a decided odour, such as onions, kerosene, vegetables, &c., and even though a cool place is desirable to prevent the evaporation of the egg content, yet evaporation is more desirable than foreign flavours.



PLATE 146 (Fig. 6).—TRAIN OF SPECIALLY INSULATED TRUCKS LOADED WITH EGGS AT COLD STORE FOR DESPATCH BY S.S. "JERVIS BAY."

This consignment was packed by the Queensland Egg Board under Government supervision.



PLATE 147 (Fig. 7).—EGGS BEING TRANSFERRED FROM TRAIN TO SHIP.
These eggs were packed under Government supervision by the Queensland Egg Board.

Regular Marketing Essential.—In winter producers should forward their eggs to market at least once a week, and during the warm months at least twice, although more frequent shipments are preferred.

On farms where poultry are kept as an adjunct to general farming operations, the number of eggs gathered in two or three days is generally insufficient to fill a case, with the result that they are allowed to accumulate for a week or more, with the consequent loss in quality, or they are traded to the local storekeeper for groceries, who invariably keeps them for another week, thus lowering the quality of the egg to a greater extent.

Many people are inclined to blame the storekeeper for the low price they receive for their eggs. They, as a general rule, are accustomed to handle eggs of doubtful quality and cannot afford to take the risk of paying good prices. The way out is in the hands of the producers. They should combine together for the purpose of collectively forwarding their eggs at regular intervals. The usual procedure is to form an egg circle or an association.

Egg circles are not new. They have been in operation in Queensland for many years, and producers in various districts are experiencing their advantages and would not go back to the old system of individual shipment to market or trading their eggs with the local storekeeper for groceries.

It costs nothing to form a circle. Neighbours merely combine for the purpose of collective marketing, and even if you are not enamoured with the idea, give it a trial and compare the resulting prices received under this system with the prices you have received at other similar periods. The writer feels confident that when once a circle has been established it will be continued.

The Results of the Correct Handling of Eggs.—During the glut season the Queensland Egg Board has been able to export 2,268,000 eggs overseas and many thousand dozen interstate. This is only possible when eggs have been handled correctly by the farmer. This has opened up a market which will absorb more than we can produce, but they have to be eggs of quality; and while we maintain this feature not only will overseas and interstate markets be available, but the increased confidence of the buying public will increase the demand locally. Fig. 6 shows a special trainload of eggs leaving the cold stores for the wharf, while fig. 7 shows the same eggs being transferred from train to boat.

Essential Features to Remember to Ensure the Satisfactory Marketing of Eggs.—

1. Breed from hens that produce not only a goodly number of eggs, but eggs of moderately large size (weighing 2 oz. each on an average).

2. Good housing, regular feeding and watering, and, above all, clean, dry nests.

3. Daily gathering of eggs, and, when the temperature is above 80 degrees, gathering twice a day.

4. The confining of all broody hens as soon as discovered.

5. The rejection as doubtful of all eggs found in a nest that was not visited the previous day. Such eggs should be used at home, where each may be broken separately.

6. The placing of all summer eggs, as soon as gathered, in the coolest place available.

7. The prevention at all times of moisture in any form coming in contact with the eggshells.

8. The disposal of young cockerels before they begin to annoy the hens. Also the selling or confining of old male birds from the time hatching is over until cool weather in fall.

9. The using of cracked and dirty as well as small eggs at home. Such eggs, if consumed when fresh, are perfectly wholesome, but when marketed are discriminated against and are likely to become an entire loss.

10. The marketing of all eggs at least once a week, and oftener when convenience allows.

11. Keeping eggs as cool and dry as possible while on the way to town and while in country stores.

12. Keeping eggs away from musty cellars or bad odours.

13. The use of strong, clean cases and good fillers.

14. The shipping of eggs to the final market at least once a week and as much oftener as possible.

General Notes.

A Central Queensland Sanctuary.

Toorilla Plains, the property of Messrs. Rogers and Sons, in the Rockhampton district, has been declared a sanctuary for animals and birds.

Sheep Pest Nomenclature.

Regulation 47 under the Diseases in Stock Act with reference to sheep tick has been cancelled, and in lieu thereof a new regulation has been approved declaring that "sheep louse" means the louse known as *Trichodectes sphacrocephalus*, *Linognathus setosus*, or any other sheep louse, and "sheep tick" means the insect (tick) known as

The Committee of Direction of Fruit Marketing.

The Minister for Agriculture and Stock, the Hon. W. Forgan Smith, has received a petition asking that a referendum be conducted to decide upon the continuance or otherwise of the Committee of Direction after 31st December, 1926.

Staff Changes and Appointments.

Department of Agriculture and Stock,
Brisbane, 11th November, 1926.

Mr. C. M. Rogers, of Stanage Bay, Toorilla Plains, Rockhampton, has been appointed an Officer under and for the purposes of the Animals and Birds Acts.

Mr. J. C. Pryde has been appointed Slaughtering Inspector, Warwick, as from the 13th December to the 8th January, 1927.

Messrs. L. F. Andersen, D. F. Keith, and H. L. Pentecost, Herd Testers, have been appointed also Inspectors under the Dairy Produce Act.

Mr. H. A. O'Donnell, of the Customs and Excise Office, Maryborough, has been appointed Inspector, Diseases in Plants Acts, *vice* Mr. K. H. Ingham, transferred.

Mr. Thos. Toms, of The Nest, Maryvale, *via* Warwick, has been appointed an Acting Inspector of Stock.

Importation of Cotton Seed.

The Minister for Agriculture and Stock (Hon. W. Forgan Smith) has informed the Press that his attention had been called to a reference made in the daily Press to the importation of cotton seed into Queensland and to the possible risk of introduction by this means of insect pests.

The Minister stated that the cotton seed imported was subject to the provisions of the Quarantine Act (Plants) administered by the Federal Government. The cotton seed was imported on behalf of the British Australian Cotton Association from Africa, and was inspected upon arrival at Pinkenba. The preliminary examination at the wharf revealed that the cotton seed was clean, and apparently free from disease, and consequently permission was given to the Association to hold the seed in bond for the purpose of its being removed to Whinstanes for treatment there for the purpose of extracting the oil and the manufacture of cotton seed meal. The imported seed is not to be mixed with other cotton seed at Whinstanes, and the processes to which the seed is subjected in the recovery of the oil and the manufacture of cotton seed meal are such as will remove all possibilities of insect or germ life surviving. The cotton seed arrived in sacks, and the sack containers are being treated by heat before being allowed to be again used. These safeguards and a general compliance with the requirements of the Quarantine Act and Regulations are considered to be ample to fully protect the cotton industry in this State.

The imported cotton seed will not be allowed, under any circumstances, to be used for planting purposes. All cotton seed intended for plant purposes is under the control of the Department of Agriculture, and by virtue of the provisions of the Cotton Industry Acts Amendment Act of the present session all seed cotton is subjected to treatment under the supervision of officers of this Department. The treatment to which the cotton seed is subjected removes all possibility of the seed being a medium for the distribution of disease or pests to the farms where cotton is grown.

The Journal Appreciated.

We desire to acknowledge the many letters of appreciation which we have received from different parts of Queensland, other States, and from overseas. The Journal's circulation is extending, and our aim is to produce a publication of all-round usefulness to the man on the land. While we do not mind a pat on the back occasionally—it helps to oil the wheels of this old workaday world—we also welcome, just as cordially, practical suggestions and constructive criticism from our farmer readers.

The Royal Society of Queensland.

At the last ordinary monthly meeting of the Society at the University the President, Dr. J. V. Duhig, M.B., was in the chair.

Mr. J. Legg, B.Sc., M.R.C.V.S., and Rev. W. P. H. Hubbard were proposed as ordinary members.

The reports of the Society's delegates (Mr. E. W. Bick and Dr. F. W. Whitehouse) to the Perth meeting of the Australasian Association for the Advancement of Science were submitted. On the motion of Prof. Richards, seconded by Dr. E. O. Marks, a vote of thanks to the delegates was passed, and it was suggested that an account of the organisation of the Perth meeting might be helpful in making arrangements for the Brisbane meeting.

Prof. H. C. Richards exhibited a sample of fossil wood from the Petrified Forest, California, presented to the Geology Department of the University by His Grace Archbishop Duhig.

Mr. H. A. Longman exhibited photographs of aboriginal rock carvings on the flat sandstone bed of a creek about 62 miles from Hughenden. The photographs were presented to the Queensland Museum by Mr. J. R. Trundle, of Hughenden.

A paper by Mr. James Groves entitled "A New Species of *Nitella* from South Queensland" was communicated by Mr. C. T. White. *Nitella phauloteles*, the new species, is described. It was collected in the neighbourhood of Brisbane by Mr. E. W. Buhot.

Mr. C. T. White read a paper by himself and Mr. W. D. Francis entitled "Plants Collected in Papua by C. E. Lane-Poole." Mr. White outlined some of the general features of the flora of Papua. In the paper the following new species are described:—*Cyathacatyx polycarpum*, *Albizzia fulva*, *Flindersia macrocarpa*, *Dysoxylum fissum*, *Aglaiia obliqua*, *Elaeocarpus comatus*, *Columbia aequilateralis*, *Pterocymbium stipitatum*, *Wormia quercifolia*, *Saurauja plurilocularis*, *Saurauja vallium*, *Saurauja Poolei*, *Terminalia foveolata*, *Terminalia catappoides*, *Poikilogyne scitosa*, *Sideroxylon anteridiferum*, *Achradotypus benefici*, *Symplocos aggregata*, *Gmelina sessilis*, and *Olearia vernonioides*. Messrs. D. A. Herbert and J. E. Young commented upon the paper.

Fruit Fly—Poison Spray as a Means of Control.

While the regular collection and destruction of infested fruit must be regarded as the chief means of checking fruit fly, in an extensive field trial carried out by the Entomological Branch of the New South Wales Department of Agriculture last season the use of a poison spray resulted in a very appreciable reduction in fly-infested fruit. The trials will have to be continued over several seasons before it can be definitely stated how useful this poison bait should prove in assisting in the control of fruit fly, but growers are recommended to give it a trial.

The formula of the spray recommended is as follows:—Juice of one dozen oranges or eighteen peaches (rejects), 4 lb. molasses, 8 oz. arsenate of lead paste or 5 oz. of arsenate of lead powder; water sufficient to make up to 4 gallons.

The spray is usually applied to the foliage, at the rate of 3 or 4 oz. only per tree, by some suitable spray apparatus or syringe, not spraying the whole tree but just applying the mixture in patches, care being taken, especially with peaches, to avoid the fruit, to which the spray is likely to adhere and on which it is likely to show. The earlier the spraying is commenced before the fruit ripens the better; that is, it is better to commence seven or eight weeks before the fruit is pulled, but spraying four or five weeks before ripening is valuable. A fresh application should be made every seven days. This means, therefore, at least four applications, but preferably six, and if rain occurs after the spray has been applied a fresh application will have to be made.

In recommending a trial of this bait it is not in any way suggested that the regular collection and destruction of infested fruit should cease. This will remain the chief method of reducing the infestation of fruit fly. It is hoped, however, that baiting will prove a good auxiliary method.

Concentrated Orange Juice.

One of the aids to the disposal of the Californian citrus crop is the preparation and sale of pure concentrated orange juice. This is put up by the California Fruit Growers' Exchange, and is sold under the name of "Califorange." This concentrate is claimed by the manufacturers to be entirely free from artificial preservative or colouring matter, and is said to be in great demand not only by the manufacturers of soft drinks and the catering trade, but also by those interested in medical institutions. The product is said to be extremely well regarded in America, and on account of its high vitamin potency and its food value, is being supplied to a number of hospitals in that country and in Europe. After the extraction of the juice from the oranges it is passed immediately into specially designed glass-enamelled vacuum pans, where it is concentrated at a temperature of 98 deg. Fahr., or just about the normal temperature of the human body. In this way it is claimed to be able to carry the concentration to a point, about 7 to 1 by volume, where the juice is preserved in its own natural sugar, without injury to flavour or vitamin content. The concentrate is then drawn off direct from the vacuum pans into carefully

SUBSCRIPTIONS TO THE JOURNAL.

Subscribers are reminded that when a cross is placed in the square on the first page of the Journal it is an indication that the term of their subscription ends with the number so marked, and that it is advisable to renew immediately if they desire the retention of their names on our mailing list.

To farmers, graziers, horticulturists, and Schools of Art the annual subscription—one shilling—is merely nominal, and the charge is only imposed to cover the cost of postage. To them, otherwise, it is an absolutely free issue. Members of agricultural and similar societies who are not actively engaged in land pursuits are asked to pay five shillings a year, while the annual subscription charged to the general public is ten shillings.

Farmers particularly are urged to keep their names on our mailing list, for through the Journal they may keep themselves well informed in respect to the activities of the Department, and other matters with which they are directly concerned. Instead of sending just the annual subscription along it is suggested that, when renewing it, they do so for a longer term. For instance, five shillings would keep their names on our subscribers' register for five years. By doing this they would obviously help to reduce clerical labour as well as avoid the inconvenience to themselves of posting annually the very small sum necessary to keep their names on our mailing list.

On another page an order form may be found, and for those whose annual subscription is about due what is wrong with filling it up now and posting it direct to the Under Secretary, Department of Agriculture and Stock?

sterilised glass jars which are immediately closed with a sterilised cork and cap. During concentration all traces of orange oil, derived from the peel in the process of extraction of the juice, is removed. In order to standardise the sweetness of the orange juice pure sugar is sometimes added. One Imperial gallon of the concentrated juice is said to contain the juice of about 75⁰ oranges and is equivalent to about seven gallons of raw juice. It is claimed by the manufacturers that independent experiment and research by well-known authorities, both in the United States and elsewhere, have established the fact that the well-known vitamin potency of orange juice is not effected by the process of concentration.

It has been suggested that a food product made from Australian oranges might find a ready market in the outback districts of Australia where ordinary antiseptic food is not easily procurable. It is believed that the American manufacturers are investigating the possibilities of the Australian market for their product. The other by-products of the American citrus industry are oil of sweet orange, lemon oil, citric acid, pectin, &c.

Some Notes on Wine-making.

Wine-making was such a complex and scientific subject, confessed Mr. Audrey H. Wilkinson at a recent conference of the New South Wales Agricultural Bureau, that he would only attempt to outline it on such an occasion. The last twenty years had seen remarkable progress in the manufacture and maturing and general treatment of Australian wines.

To begin with, a yeast culture should be made by picking ripe grapes which were as nearly perfect as possible, crushing them (minus the stalks) into a perfectly clean, sterilised, wooden tub or small vat and allowing them to ferment. If this was done a few days before vintage started the culture should be fermenting vigorously by the time it was required to start fermentation in the first vat, and could then be carried on from vat to vat throughout the vintage. In many grapes the varying sugar content at the time of picking was responsible for producing different types of wines. For instance, the Hermitage or Black Shiraz grape, picked with 18 to 21 per cent. of sugar by Keen's saccharometer, would make a light claret; with 22 to 25 per cent. of sugar a Burgundy; and with 26 per cent. or more of sugar the wine would be fortified and made into a port.

Absolute cleanliness by daily sterilising of all utensils was essential. Also, the control of fermentation was of vital importance, as when a vat became over-heated lactic acid was likely to appear, in which case the wine would be only fit for distillation. Up to date wine-makers used a thermometer on each vat at least once daily. When the temperature reached 90 degrees Fahrenheit and showed signs of rising higher the fermentation should be checked by the addition of metabisulphite of potassium in the proportion of 1 oz. to 100 gallons of must, until the maximum dose of 4 oz. per 100 gallons was reached. When fermentation was almost completed in dry wines the must was racked into casks, and then followed the maturing processes of further rackings, blending, fining, and finally bottling, when it was ready for the consumer. Sweet wines were racked into casks when ready to fortify, and then went through similar treatment to dry wines. It was in these finishing operations that extra skill and experience were required.

Regarding the keeping qualities of wines, it seemed a curious fact that hock, which was one of the lightest wines, was credited by French authorities with keeping in sound condition for 200 years, whereas fifty years was stated to be the limit for claret.

Liquid Manure.

The use of liquid manure is of special importance in gardens, especially the section devoted to vegetable growing, and every gardener should know how to prepare and apply it. A natural and very effective liquid manure consists of the draining of cattle sheds, stables, dung heaps, &c. Such drainings should, however, be diluted, according to strength, before application.

Liquid manure has special advantages in relation to garden crops, its stimulating effect on which is very noticeable, the fertilising ingredients of manure in a liquid form being more readily available to the plant. Manure in a solid state can be applied to the soil before the seeds are sown or seedlings planted, but subsequently it cannot be dug into the soil without some interference with the roots of the growing crop, even in the case of well-established plants. It is partly on this account that liquid manure is so valuable.

On pot plants and flower beds liquid manure has very beneficial effects. The solid manure originally applied to the soil gets in time exhausted by the growing plant, and it is at this stage that more nourishment is required, the soil becoming poor and incapable of maintaining the plant in a healthy and vigorous state. Liquid manure, which is easily applied, comes to the rescue and remedies the defect. In short, all flower plants, vegetable crops of a quick-growing nature, and pot plants of all kinds require treatment with liquid manure to ensure the best results.

To make liquid manure, soak a sugar-bag of fresh poultry, cow, or pig manure for a week in a cask with the head knocked in—one holding 40 to 50 gallons is the most handy. Use the resulting solution at the rate of one part to three parts of fresh water. Fill the cask again, and when the manure has soaked for a week use the solution at the rate of one part to one part of fresh water. The cask may then be filled up a third time, and after the liquid has been allowed to stand for a week it may be used neat. This form of liquid manure is safe, and if it is applied weekly at the rate of 4 gallons to every 18 feet of a running row no further stimulant is necessary for most growing crops.

Many crops, such as lettuce, cabbage, and silver beet, will be more tender for being forced by applications of liquid manure.

Do not apply liquid manure to plants if the soil is at all dry. Dry soil should first be watered.

Orchard Notes for January.

THE COASTAL DISTRICTS.

All orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the regular wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be manured now, using a complete manure rich in potash and nitrogen. Pineapples may also be manured, using a composition rich in potash and nitrogen, but containing no acid phosphate (superphosphate) and only a small percentage of bone meal, ground phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, both in the Brisbane and Coominya districts, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and the cases marked in accordance with the regulations under the Fruit Cases Acts and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed, which means that they contain sufficient sugar to enable the fruit to mature properly. Immature fruit must not be marketed, and if an attempt is made to do so the fruit is liable to seizure and the sender of the fruit to prosecution under the abovenamed regulations. Further, the fruit must be graded to size and the number of fruit contained in a case must be marked thereon. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and overripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into tight boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season; at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry much beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good firm apples should stand the journey to the Central, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit, to grade it for size and colour, to pack it carefully and honestly, placing only one sized fruit, of even quantity and even colour, in a case and packing it so that it will carry without bruising, and, when opened up for sale, will show off to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior, badly graded, or badly packed fruit is very likely to find when the returns for the sale of his fruit are to hand, that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then "why spoil the ship for the ha'p'orth of tar" after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

- (1) That the fruit must be fully developed, but yet quite firm when gathered.
- (2) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.
- (3) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.
- (4) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket and would have been better off had he not attempted to market it.

If spraying with arsenate of lead, and systematic bandaging, has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening

pip fruits; but if these essential operations have been neglected or carelessly carried out, a number of moths will hatch out and the eggs laid by them will turn to larvae that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.

Fruit fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed, or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstances being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tynes set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be sown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved

in silo or stack. As natural and summer-growing artificial grasses may be expected to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "lay-out" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisture-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.—To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle, lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Keep a sharp lookout for slugs and caterpillars.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Foxhunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.

WANTED! THE SPIRIT OF SERVICE.

Universities once were the seats of learning. Now they have become little more than glorified technical colleges, where men and women qualify for the more lucrative professions. It is safe to say that fully 90 per cent. of those who attend universities in Australia do so merely because they wish to become lawyers, or doctors, or engineers, or school teachers, and not because they have any deep-seated thirst for learning and intellectual development for their own sake. That is where our great universities fail—they turn out many journeymen, but few intellectuals. That fact is evidenced by the exceedingly small number of university graduates who play a part in guiding public opinion and who take their share of public service. The utilitarian aspect of all the courses at the universities leaves no room whatever for the inculcation of that spirit of service which Australia badly needs amongst the rising generations. There is a crying need for the development of a spirit of service throughout the community.—Melbourne "Leader."

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

1926.	NOVEMBER.		DECEMBER.		NOV.	DEC.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	5.3	6.9	4.50	6.32	2.42	2.16
2	5.2	6.10	4.50	6.32	3.14	2.47
3	5.1	6.11	4.50	6.33	3.45	3.21
4	5.0	6.11	4.50	6.34	4.17	3.54
5	5.0	6.12	4.50	6.35	4.49	4.40
6	4.59	6.13	4.50	6.35	5.24	5.26
7	4.58	6.13	4.50	6.36	6.2	6.18
8	4.57	6.14	4.50	6.37	6.43	7.16
9	4.57	6.15	4.50	6.37	7.31	8.16
10	4.56	6.15	4.51	6.38	8.25	9.21
11	4.56	6.16	4.51	6.39	9.23	10.25
12	4.55	6.17	4.51	6.40	10.24	11.29
13	4.55	6.18	4.51	6.40	11.28	p.m. 12.32
14	4.54	6.18	4.52	6.41	12.33	1.33
15	4.54	6.19	4.52	6.41	1.37	2.35
16	4.53	6.20	4.52	6.42	2.40	3.37
17	4.53	6.21	4.52	6.43	3.45	4.41
18	4.53	6.21	4.53	6.43	4.48	5.53
19	4.52	6.22	4.53	6.44	5.52	6.43
20	4.52	6.23	4.54	6.44	6.57	7.40
21	4.51	6.24	4.54	6.45	7.59	8.33
22	4.51	6.25	4.55	6.46	8.58	9.20
23	4.51	6.26	4.55	6.46	9.53	10.1
24	4.51	6.27	4.56	6.47	10.44	10.38
25	4.51	6.28	4.56	6.47	11.28	11.13
26	4.50	6.29	4.57	6.47	nil a.m.	11.45
27	4.50	6.29	4.57	6.48	12.6	nil a.m.
28	4.50	6.30	4.58	6.48	12.42	12.15
29	4.50	6.31	4.59	6.48	1.14	12.47
30	4.50	6.31	5.0	6.49	1.46	1.19
31	...	...	5.0	6.49	...	1.54

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

6 November	●	New Moon	12 34 a.m.
13	☾	First Quarter	9 1 a.m.
20	○	Full Moon	2 22 a.m.
27	☾	Last Quarter	5 15 p.m.

Mars will be in opposition to the Sun on 4th November—that is, on the opposite side of the sky—in the east when the sun is setting, in the west when it is rising, and in a favourable position for observation. Mercury will be at its greatest elongation, 23 degrees east, on the 5th—that is, about 23 degrees below the horizon when the Sun rises, and about the same distance when it sets; it is therefore in a favourable position for observation on or near that date. It will rapidly draw nearer to the Sun, which it will pass on the 20th, becoming of course invisible.

Venus will be in superior conjunction on the 21st—that is, in that part of its orbit which is almost directly behind the Sun; it will therefore be invisible during this month. Saturn will also be in conjunction with the Sun on this date—that is, almost in a direct line behind it. Mercury will be in conjunction with Venus on the 25th, therefore there will be an apparent grouping of these three planets near the sun on or near that date.

The Moon will pass over and occult Epsilon Tauri on the 20th, a little before 9 p.m.

Zeta Tauri, another star of Taurus, will be occulted between 1 and 2 o'clock in the morning on the 22nd. These can be observed throughout Queensland.

An occultation of Eta Leonis will occur on the 27th in the north-west, about 3 a.m., lasting about twelve minutes.

5 December	●	New Moon	4 11 p.m.
12	☾	First Quarter	4 47 p.m.
19	○	Full Moon	4 7 p.m.
27	☾	Last Quarter	2 59 p.m.

Jupiter will be in conjunction with the Moon on 10th December, at 5.4 p.m.; both will be visible in the west after sunset.

Mercury will be at its greatest elongation, 21 degrees 13 minutes west, on the 14th, and will therefore be visible in the eastern sky before sunrise, with Saturn apparently in remarkably close proximity.

Mars will be in conjunction with the moon at 6.18 p.m. on the 15th, and when visible soon after sunset will be rather more than the length of the Southern Cross from the Moon.

The Sun will arrive at its greatest declination south about half an hour after midnight on 22nd December, when the Australian summer solstice will occur. On and near this date, at midday, it will be noticeable that the Sun will cast the least amount of shadow of any time during the year.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

